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Illinois Medical Journal

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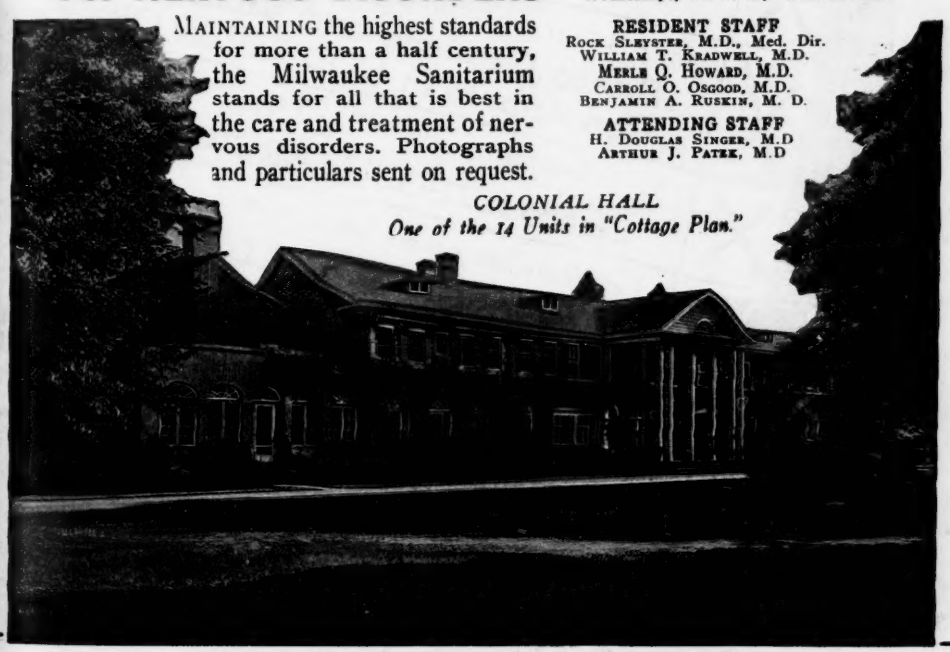

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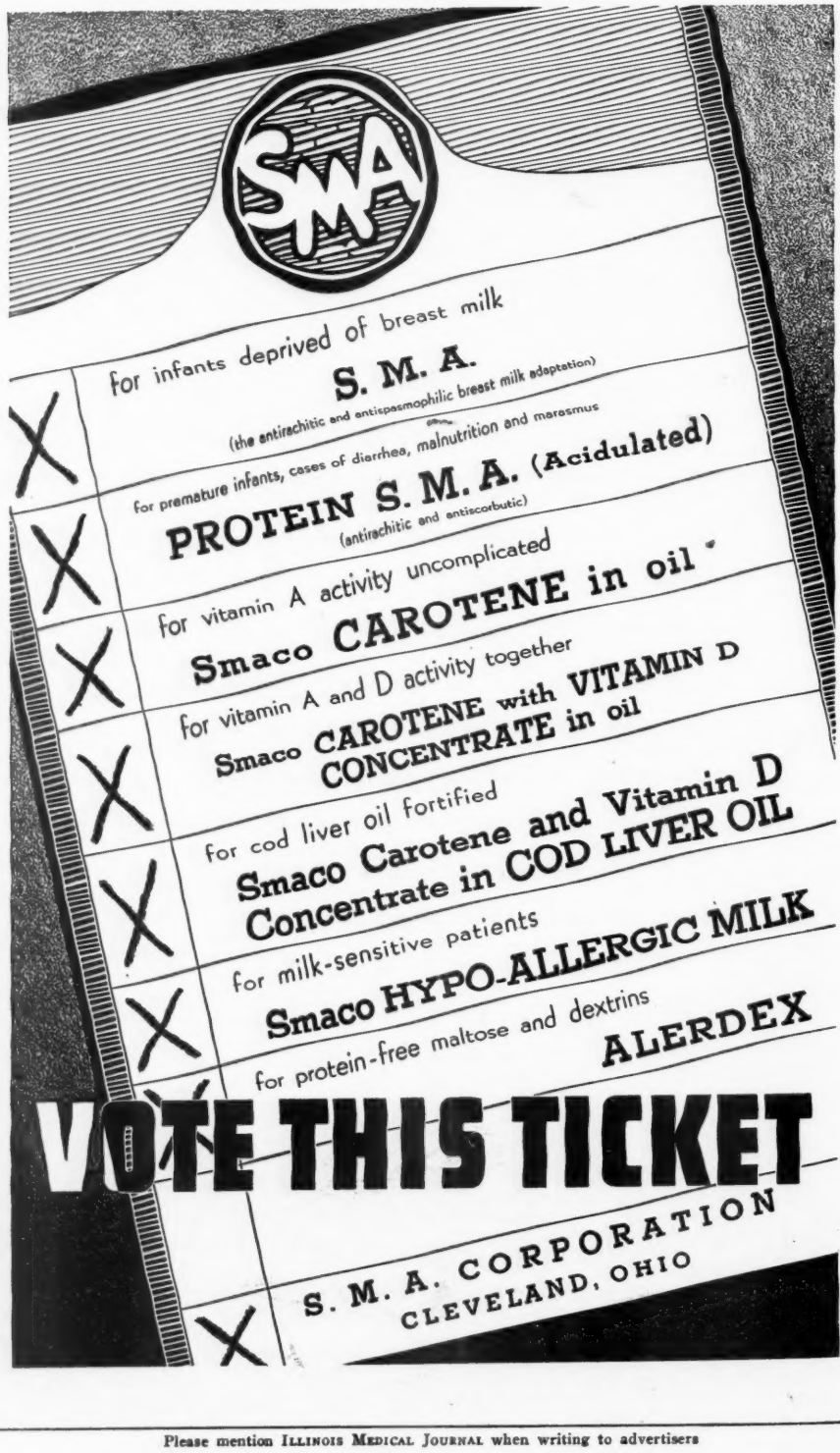
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ILLINOIS MEDICAL JOURNAL

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Editorials

IS BIRTH CONTROL THE GREAT ADVANTAGE TO CIVILIZATION THAT ITS PROPONENTS DECLARE?

Based upon an expanded experience, even though a partial one, at least a preliminary day of reckoning with the gods of birth control confronts us. Do they assume a virtue when they have it not? Or is birth control the great advantage to civilization that its proponents declare? Government statisticians assert that the movement towards a stationary or a declining population is gaining speed surprisingly.

For this decline in the birth-rate, responsibility is laid at the door of artificial control. Economists are taking a new slant upon the maturing and peculiar crop of problems involving economic, educational and political problems certain to result from what will be a stationary population of elders.

Concomitantly with the rapid spread of contraceptive information has been noted an increase in youthful marriage. This angle alone, according to what Dr. Barton C. Hirst of Philadelphia recently told the American Medical Association, may prove to be the cause of much national woe.

The battle for and against birth control exists as one of the argumentative lights of pulpits and forums. One church remains the only religious organization that in its entirety condemns completely the practice, with the assertion that contraception is a violation of divine and natural law.

Federal figures claim that so protean has become the practice of birth control that the population in 1940 will be some 9,000,000 off previous predictions, by totaling only 131,000,000 instead of 140,000,000.

The Bureau of Census in its preliminary figures finds that in 1932 the birth rate fell to less than 18 per thousand of population as against 25.1% per thousand of population in 1915. The indicated rate for 1932 is about four per cent less than that for 1931. Because of a sharp

decline in marriages in 1932, the figures for the future are expected to reveal an even greater decline.

Willard C. Smith, assistant statistician of the federal division of vital statistics notes a proportionate increase of older persons in the population. Between 1920 and 1930 there was an increase of 34% in the number of persons among the population who were 64 years of age or even older. In 1931 and 1932 this percentage has grown greater.

The Committee on Social Trends, whose study began at the request of former president Herbert Hoover, indicates that "young people are more willing to marry if fortified with birth control knowledge than they would be if they were reasonably certain that they would have children born at rather regular and frequent intervals."

And, add to the "causes of the depression"—another finding of this committee is that this declining birth-rate, attributed to birth control may have helped to bring on the depression.

States this committee, in part, "because 'business as usual' has been predicated to such an extent upon a rapidly growing population in the past, it is reasonable to urge that the change in the rate of population growth now going on, and to be expected, be given careful consideration in planning for the rationalization of social and economic life.

"Owing to the advances of medical science, a progressive lengthening of the span of life has been contemporaneous with the decline in births, and an increasing demand for old-age pensions is predicted. Another likely consequence will be the necessity for industry to retain middle-aged employees to a greater extent than now obtains. In the political field the older-age groups may result in greater conservatism."

Dr. Benton Hirst told the American Medical Association, in convention in Milwaukee, that some of the racial strains brought in of late years which "were not of the best are contributing more than their share to our population. We might well ask ourselves if our loss of wealth, our bad government, the impotency of Congress and the wave of dishonesty that have swept the country are not due to a deterioration of the national character."

This of course is protest against the practice of birth control by the nation's "better elements" with their increasing restriction of family.

Discussing both sides of the question of birth control, the familiar arguments for birth control are that having fewer children would make for superior children, that spacing them would improve the health of mothers, and that large increase in the population made it harder to earn a living.

As against these arguments remember that Benjamin Franklin was the fifteenth child. Dr. Hirst expressed a doubt that "the pampered child and a half of to-day is better than the child of a former generation with eight or nine brothers and sisters. An undue limitation of births "has been one of the precursors to the extinction of a civilization or the subjugation of a people by a more virile and prolific race. On this road we have already gone some distance."

In reply to this a writer in The New York *Times* is cited by *The Literary Digest* as saying that the widespread practice of birth control by all economic and social classes will result in a higher birth-rate among the "upper" classes and a lower birth-rate among the "lower" classes is plainly indicated by a number of studies in the differential birth-rate in cities of Northern and Western Europe, where it is known that birth control is being generally practiced by all classes."

Again, the Louisville *Courier-Journal* observes that if "we would call the roll of the 'insidious and iniqitous lobby' which infests the halls of legislation, we would find few, if any, immigrants of late years; but most of them from good families with college educations. If we would trace to their source the corruption funds raised to subsidize governments and control legislatures, we would discover them in enterprises managed by highly educated specimens of the 'better element.' And if observations are confined to the underworld, who own the slums where it spawns?"

The New York *Herald Tribune* can see in a lower birth-rate "some hope that a sense of responsibility for the health, education and opportunities of the next generation is coming to govern the social thought of the present one," yet another statistician of repute recently stated that "the birth-control movement will have much to answer for unless it can square its account with the American people by emphasizing at this very time the need for correctives of its own activities in earlier years. It has

placed bundles of dynamite all over the country. It is now high time that it began to bring back, or at least to remove the fuses."

Other provisional findings of the United States Bureau of Census indicate that this decline in the birth rate is more urban than rural. Fact that in a number of states some rural areas actually experienced an increase in the period of the greatest decline—1931-2.

This would seem to be a fresh instance of false figures. This rural increase in birth rate is probably brought about by the tendency during that time to "go back to the farm" as revealed by the report of the Bureau of Agricultural Economics with its recent estimate of a record rural population of 32,242,000. Like maternity mortality statistics the lack of the same yardstick is apparent. In calculating rate of birth to population in the rural districts proportionately too small a divisor is used and vice versa in urban calculations too large a divisor.

Let no false figures delude you. The decline in birth rate is a general phenomenon and all too dubious a factor for the progress and prosperity of the race.

VARIOUS FACTORS HAVE PAVED THE WAY FOR STEADY INSIDIOUS DETERMINED ENCROACHMENT OF STATE MEDICINE AND LAY CONTROL

If Thomas Carlyle with his scalpel eye and caustic comment lived today he would call physicians rather than economists "Respectable Professors of the Dismal Science."

For so beset upon is medicine by economists both false and true, that instead of the jesters poking fun at the profession as "men who refuse to take their own medicine," attempted lay dictation is making doctors and surgeons become own brothers to those "miserable who have no other medicine but hope."

At the present rate of choking state medicine down the throats of the doctors even hope will soon be separated from the Aesculapian soul, in which this emotion of "faith pitted against experience" still lingers as a prayer that American citizens will realize before it is too late that state medicine, federal control and lay dictation are synonymous with medical destruction.

Various factors have paved the way for this steady, insidious determined encroachment of state medicine and lay control.

To a certain extent the specialist who can see no path but his own is responsible in that the specialist "dressed in a little brief authority," for a time could see only *other specialists* and none of them could visualize anywhere in the scheme of preventive, diagnostic or curative medicine that staple ingredient for public health and welfare and individual health and happiness, the general practitioner and family physician. Though a tendency for the better looms upon the horizon, thanks to the geniuses among the specialists, not altogether has the medical profession escaped from the sad anacoluthonism of having the tail wag the dog!

This error in mechanics has cost the profession dear, and before the end of things is achieved, will cost the general public more dearly! In the gaps between the specialists, in crept the propagandists for state medicine with its tentacles of lay dictation and federal control, irresponsible systems and overwhelming taxation.

Ignoring the family doctor, the man who was one of the most important factors in building up the healthiest of civilized nations, the propagandists took as a table of weights and measures for medical economics, the *standards prevailing in other countries* which was about as sensible, as apt and as accurate as attempting to measure cloth by the quart cup or cornmeal by the yard! Especially when the brokendown standard of state medicine, a miserable failure wherever employed in Europe, a detriment both to the public and to the practitioner, was called upon to be the sheave and pulley by which the most learned crowd of unpaid laborers the world has ever known, the medical profession, is to be lifted from the current chaos of unrecompensed toil and sacrifice, a chaos involving not only the medical profession but its correlating auxiliaries —the dentists and the hospitals and those indicated works of charities—*clinics for the destiture and deserving pauper.*

And a pauper is, by the grace of the dictionary, "A person destitute of means, except such as are received from charity; specifically, one who receives aid from public poor funds."

If an accurate canvass were made of recipients of clinical medical service it is doubtful if fifty per cent. would classify under that definition.

More and more the scope of semi-incomed individuals for gratuities has extended until this drain upon physicians and hospitals has become

unbearable. And in a direct ratio to the burden upon the medical profession has increased the interest in which the non-medical man of wealth or of political influence has seen in the exploitation of this great science, fundamental to individual and national health and welfare, a great and virgin field for interference and command.

Behold as a result the hundreds of foundations, of clinics and of funds for this or that but which really and truly are only weapons for the subsidizing of such medical auxiliaries, and in some instances—God save the mark but it is the simple truth—such medical men as could be brought beneath such maleovelent influences. In other words, business men have gleaned their harvest from this land of plenty and of promise, and finding time heavy on their hands, become imbued with a mock philanthropy, a false sense of the humanities and coupling this with their inherent gift for management and cultivated curiosity as to everybody else's affairs, act as sadistic Napoleons and would beat down beneath their fists and their finances any profession, any industry that hitherto had escaped them. Unfortunately, henchmen to their liking, medical traitors, have not been wanting to aid them in their foul desires.

What with this and what with that, the selection of state medicine, the building up of a lay bureaucracy to wheedle and bombast a sacred science, hit upon a fine, hand-polished, gold-encrusted wooden horse with which to land their traitorous designs within the gates.

That the task of the physician today is more intricate than ever before arises from the fact that every inch of progress in medical research has brought in additional batteries of aids to medical efficiency and an attending corps of scientific filles du regiments to wait upon them. The technical technique of modern medicine demands and has hundreds of semi-trained, semi-medical workers. And to these, too little trained for physicians, too much trained to admit their own lack of training, state medicine looks like a vision of Mecca to a devout Mohammedan.

The laissez-faire attitude of the modern family to sickness in its midst has come to insist upon high-priced hospitalization for a sick member of the family, even when it can not be afforded by the family or individual income, rather than to endure the personal discomfort of a sick person in the house. As a result hospital bills far too frequently go unpaid, and the "high cost of sickness" is laid at the doctor's door and plans to get it back, literally out of his hide, are set afoot by propagandists and backed up by lay philanthropists of mistaken aims.

Now physicians have always been willing to give their services when conditions indicated such a largesse, and probably through the centuries will continue with such chores. But there is not now, nor never was a physician worthy of the name who was willing to let the business men of his own or of a neighboring community, nor the political jobbists tell him when and where and how he was to give of his skill, his health, his means and his wisdom.

And that, my friends, is what state medicine, medical bureauracies and lay and politically dictated and controlled schemes of medical economics are setting out to do.

ATTORNEY GENERAL OF WISCONSIN HOLDS THAT THE STATE BOARD OF MEDICAL EXAMINERS CANNOT DELEGATE ITS POWERS TO THE NATIONAL BOARD OF MEDICAL EXAMINERS

On July 29 the State Board of Medical Examiners of Wisconsin was prohibited from endorsing without further examination any candidates for practice in Wisconsin who had passed examinations of the National Board of Medical Examiners, Philadelphia. The opinion from Atty. Gen. James E. Finnegan was given to Robert E. Flynn, secretary of the board, who had asked whether the board could endorse without further examination, and what the duties of the board were in examining standards of foreign schools whose graduates apply for a license to practice in Wisconsin.

"The statutes have made it the duty of your board to determine whether or not an applicant is qualified to receive a license, and the duty cannot be delegated," Finnegan said. He added, however, that the state board could if it wished use all or part of the questions asked by the national board.

Regarding the other question, Finnegan said: "The state board has broad discretion in determining reputability of professional schools, and where it is impossible for the board to determine whether or not a college is reputable, the burden is upon the applicant to prove its reputability."

In cases where a professional school has been admitted to standing in Wisconsin, however, the state board may not remove it from the approved list without a hearing, Finnegan held.

THE BIRTH RATE KEEPS FALLING—MORE BABIES BORN IN HOSPITALS

The birth rate in the United States today is apparently two-thirds of what it was twenty years ago. In connection with this statement it is interesting to note that more babies are born in hospitals at the present time than in any other period of American history.

The U. S. birth rate in 1916, according to Mr. Glossinger, was exactly 25 per 1,000 population. The present birth rate is approximately 17 per 1,000 population. On the other hand, over 700,000 babies of the little more than 2,000,000 births that occur in the United States annually, or one-third of all births, see their first light of day in hospitals. And the trend appears definitely in favor of hospital confinements and away from delivery in the home.

There are 6,500 registered hospitals in the U. S., 134 with a capacity of approximately 8,000 beds are devoted exclusively to maternity service.

ANTI-BLACK WIDOW SPIDER SERUM AVAILABLE

Concurrent with the reports of more than 600 persons being bitten by the "Black Widow Spider" with a mortality record of 40, comes the announcement that E. R. Squibb & Sons are now supplying Antivenin (Anti-Black Widow Spider Serum). Widespread professional interest has been shown in methods of treating these bites, especially with the steady increase in the number of cases reported from southern, southwestern and western sections of the United States.

Antivenin is prepared by the hyperimmunization of sheep with repeated doses of venom from the black widow spider. The serum is standardized by determining its neutralizing effect when mixtures of it with venom are injected into young rats.

SCIENTIFIC EXHIBITS

The Illinois State Medical Society will meet in Peoria, May 18, 19 and 20, 1937. It is hoped that the Scientific Exhibits will be even better than at the Rockford and Springfield meetings.

Those wishing to prepare exhibits should start planning them now and should apply for space at an early date. The fact that the meeting next year comes about three weeks before the A. M. A. would make it possible for those planning exhibits for the Atlantic City meeting to show them first at Peoria. Many have found that it is possible to make improvements in any exhibit after its first presentation. We are informed that the presentation of an exhibit at a state society meeting does not interfere with its subsequent presentation at the A. M. A.

Those desiring applications for space, write the secretary of the Committee on Scientific Exhibits.

N. S. Davis, III
700 North Michigan Avenue
Chicago, Illinois.

THE WILLIAM HAMLIN WILDER FOUNDATION

The Chicago Ophthalmological Society is raising a Memorial Fund of $10,000 in memory of Doctor William Hamlin Wilder.

1. This project shall be known as the *William Hamlin Wilder Foundation,* sponsored by the Chicago Ophthalmological Society.

2. The purpose of the Foundation shall be to establish and maintain a Lectureship in Ophthalmology or Allied Topics, the lecture to be presented in Chicago every two years.

3. A fund of ten thousand dollars shall be raised and put into trust in the Northern Trust Bank.

4. The fund shall be under complete control of the Bank which shall expend the interest in accordance with the provisions of this Foundation and under the direction of the Governing Board.

5. The interest on the Fund shall be used solely for payment of an Honorarium to the Lecturer and the expenses of publication of the lecture, a copy of which shall be sent to every contributor toward the Fund.

6. Administrative Regulations.

a). The Governing Board of the Foundation shall consist of the President of the Chicago Ophthalmological Society and the three most recent Past Presidents.

b). The Lecturer shall be selected by the Governing Board at least one year in advance.

c). The Lecture shall be given at a Special Meeting of the Chicago Ophthalmological Society, devoted solely to that purpose and open to all, the time and place to be selected by the Governing Board.

d). The Governing Board shall arrange for publication of the lecture, alternately in the American Journal of Ophthalmology and the Archives of Ophthalmology.

e). The Governing Board shall be the sole authority to authorize expenditures by the Bank.

f). Any of the provisions of this Foundation may be changed by joint action of the Board of Governors and the Northern Trust Bank, should circumstances make such change advisable.

All those wishing to contribute to the Fund will please send their checks to the Northern Trust Company, care of the William Hamlin Wilder Foundation.

WORKMEN'S COMPENSATION ACTS: DEATH FROM SUNSTROKE

Death from exposure to the elements, including the heat of the summer and the cold of the winter, said the Supreme Court of Iowa, is not compensable if the hazard is the same to which the general public is exposed. For compensation to be recoverable for death from sunstroke, the deceased must have been subjected to a greater hazard from heat than that to which the public generally in that locality was subjected. This distinction is recognized by all the authorities. Compensation was denied in this case. (*Wax* v. *Des Moines Asphalt Paving Corporation* (Iowa), 263 N. W. 333.) —*Medicolegal Abstract, Journal of the American Medical Association.*

MEDICAL ECONOMICS

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of the
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Address all letters and commnications to the Chairman.

The recent statement of the Editor of the American Medical Association, "Truly social medicine and Medical Economics are the problem of the day," is concrete evidence that the importance of this subject has penetrated the seats of the mighty as well as those of the general practitioner. For some time the voices raised on this subject have been like those crying out in the wilderness, ofttimes apparently in vain. It is encouraging to see that the message has finally been received and it is to be hoped that real leadership will be given to component state and county societies in their endeavors to correct present evils and avoid those impending.

Reading current writings on medical economic subjects, one is impressed by the attention being given to the potential political influence of the medical profession. This influence is rarely, if ever, considered from a partisan angle, but from the the larger angle of real service to the state and nation. Surely no man should apologize for trying to lend a helpful influence to his country and his fellowman. We would particularly recommend the article of Dr. Fred Moore on "Interprofessional Relations in the County," as presented at the annual meeting of the Northwest Regional Conference last winter. This is available in mimeograph form to those interested on application to Dr. Harold Camp, Secretary of the Illinois State Medical Society, at Monmouth, Illinois. To those who have thought little on the subject it will open up an entirely new field of activity for the medical profession with concrete plans for action and accomplishment. Recently the Minnesota State Medical Society Bulletin contained the following:

What can I do for my county and state medical society?

Do you know the Senator from your own legislative district?

Do you know the Representatives from your district?

If not, make it a point to know both.

1. Find out how they feel about Organized Medicine.

2. Find out what their ideas are on Quack medicine too—on State Medicine. And on all the economic problems that confront the medical profession today.

Friendly informal conferences on these matters between legislators and the doctors in their own districts provide an excellent source of information for legislators.

Information thus secured on the policies of the legislators will be of value, also, to the Committee on Public Policy and Legislation of the State Association.

Of course Illinois has a most efficient Committee on Legislation, under the chairmanship of Dr. John Neal of Springfield and they watch out for the good of both the people and physicians of Illinois. However, it seems only right that all physicians of the State should evidence their interest in the act of their elected legislators by knowing them and letting them know their wishes and desires. It is encouraging to see numerous state societies recommending this more friendly relationship with the legislators both before and after their election. Following this article will be the annual report of Dr. Neal of the activities of his Committee for the past year. A careful reading of the same will convince all that Dr. Neal is most alert and knows exactly what is going on in the Illinois Legislature. Also, he is constantly watching for any legislation inimical to the citizens of the state as well as the medical profession. His contacts with the legislature make his influence great.

With the return of the care of the indigent to the township supervisors, there is the danger that one of the most fundamental privileges of the people may be lost and that is they may no longer be able to have the physician of their choice in case of sickness or injury. This is, of course, unfortunately true when all of the

work is done by some one physician, selected by the supervisor, regardless of whether he works on a contract or at reduced fees. Many people will not have the so-called "poor doctor" and in that event the family physician carries on, without pay as usual. It is wrong of course, but does answer one of the greatest criticisms of state medicine and that is the loss of the right of the poor to have the physician of their choice. In a later article we will discuss the plan of having the local medical society take the work as a group and allow the poor to select the doctor they desire. This plan which originated in Waterloo, Iowa, over twenty years ago has been in use in Illinois for over fifteen years with apparent satisfaction to the poor, the supervisors and the medical profession. Any plan that can satisfy groups with such different desires surely is worth consideration by the rest of the state.

Be sure and read the report of the Legislative Committee of the Illinois State Medical Society for the past year.

E. S. HAMILTON,
Chairman of Committee on Medical Economics

RATIONAL TREND MARKS LEGISLATIVE ACTS

The State Legislature has sat almost continuously since early October, 1935. To meet problems of broad social significance which required new or modified legal sanction, the Governor felt impelled to call the General Assembly into four extraordinary sessions. These have run simultaneously and all but the second has terminated. The second special session, called primarily to deal with the problem of unemployment relief, will resume deliberations in August after a recess period of some two months.

Although the terms of the call for the four sessions were broad enough to embrace other subjects, the problems of imperative importance related to relief, local government finance, workmen's compensation and elections. The chaotic character of the situation which had arisen in connection with these matters is suggested by the fact that 423 bills were offered in the four special sessions as remedial measures and no less than 114 have become laws.

While none of the bills offered related strictly to medical practice or the medical profession, many of the measures are of profound interest to physicians as citizens. In general, the bills offered and laws enacted reflect a sounder and more practicable attitude of the lawmakers, and indirectly of the public, on economic and social matters than has prevailed during the preceding three years. Apparently, the assemblymen at Springfield as well as members of Congress at Washington are about to discover that even the riches of Santa Claus can be exhausted and that his ample storehouse must be refilled at the source of production or remain empty.

People generally had apparently forgotten or refused to believe that federal funds come from local sources and that States obtain revenue only from the inhabitants of its component political units. States appeared to regard federal grants as gifts that flowed from the inexhaustible fountains of a benign and generous Uncle Sam who had only to push a button to replenish his coffers, local agencies assumed a similar attitude toward the State.

Laws passed by the four special sessions in Illinois indicate that a reverse trend of thought has set in. No less than 43 of the new laws enacted modify the taxing and bonding powers of local governmental agencies, county, municipal, school and park boards and councils, so that emergency as well as ordinary problems of finance can be met locally. While some equalization of local burdens is necessary with respect to relief, education and other local responsibilities in many instances where peculiar circumstances prevail, the basic principle of requiring each locality to be self-sustaining is gaining ground and the newer laws reflect movement in this direction. This is the most promising aspect that has characterized legislative attitudes for many years.

The new laws concerning occupational diseases and workmen's compensation represent an outstanding forward step in legislative action. A close study of the provisions of these laws, four in number, indicates that they are fair and just to workmen and employers alike. They provide for the reasonable compensation of employees, or their beneficiaries, who suffer injury, damage to health or death from occupational hazards. At the same time they set a definite limit to the financial responsibility of the employers who participate in the system created.

The State Industrial Commission and the State Department of Labor have been given

referee powers with respect to disputes in compensation cases and have been clothed with authority to promulgate rules and regulations for the control of environmental conditions that affect occupational hazards.

Supplemental to the laws, there has been created in the State Department of Public Health a division of industrial hygiene. With a staff of specialists in industrial sanitation, headed by a physician experienced in industrial medicine, this new division will make scientific studies and render reports that should be of great value to all concerned in the control of occupational diseases.

With this set-up, Illinois is in a position to lead the nation in industrial medicine of a preventive character. This is in line with the growing industrial importance of the State.

Designated as House Bills 9, 10, 11 and 12, while in the legislature, third special special session, the new workmen's compensation and industrial hygiene laws raise substantially the maximum amounts recoverable as compensation for injury, the specific sums varying according to the pay of the employee and the number of his dependents; gives the State Industrial Commission power to make rules and regulations concerning ventilation, guarding machinery, storage of personal clothing and other property, methods of handling poisonous substances, means of controlling dust, fumes, gases, vapors and air pressure as these things affect employees; requires employers to accept the rules of the Commission.

While employers may be compelled to install dust and fume collecting machinery and utilize other methods of controlling environment, they are relieved from the liability of "ambulance chasers" and other extortioners who use disgruntled and gullible employees, alleged to have suffered injury from employment, to persecute manufacturers.

This is a sample of sound legislation that recognizes human values, scientific methods of disease control and the economic and social factors involved in modern problems. Here a reasonably fair balance has been struck between the complex and varied elements in all problems that affect civilized existence under modern industrialism.

It is not too much to say that the attitude of organized medicine in Illinois, as expressed through the Council, officers and committees of the Illinois State Medical Society, has been instrumental in bringing about a more rational attitude in legislative matters.

The next regular session of the General Assembly, which opens in January, 1937, will undoubtedly bring with it a host of proposals that range from fantastic to ridiculous but recent experiences suggest that less experimental and less radical proposals than many offered and enacted during the last few years will alone command serious consideration.

J. R. NEAL,
Chairman Legislative Committee.

FREE SERVICE FOR THE HARD-OF-HEARING

Probably every physician comes into contact at least occasionally with one of the three following groups: 1. parents of a child who can neither hear nor speak; 2. parents of a child whose hearing is somewhat impaired; 3. adults who are losing their hearing. But although physicians are frequently confronted by the educational, social and personal problems presented by deafness, not all of them are aware of sources of information on these problems. Therefore we call attention to the following letter describing the free services which the Volta Bureau, Washington, D. C., is prepared to offer:

"We consulted several specialists, and all of them confirmed our fears, but none offered any solution of our problem." Thus the mother of a small deaf child wrote to the Volta Bureau. The sentence might be quoted verbatim from many letters written by parents of deaf or hard of hearing children, or by hard of hearing adults.

The knowledge that deafness is present and that it is incurable comes with the force of a major calamity. It is so crushing in its effect that something positive in the way of help most be offered immediately, if the individual is not to spend desperate years in a bewildered effort to adjust himself. The parents of a deaf child must be told that the child can be taught to speak and can be successfully educated, and that this education may be begun at home immediately, even if the child is not more than two years old. The parents of a child whose hearing is only slightly impaired must be given advice as to his adjustment. The hard of hearing adult must be told about lip reading, about hearing aids, about social efforts in his behalf.

The Volta Bureau was established for the purpose of furnishing all this information to all who ask for it. Its services are free. Alexander Graham Bell, the son of a hard of hearing mother, the husband of a deaf wife, the lifelon friend of everyone handicapped by deafness, used the money received as a prize for inventing the telephone to found the Volta Bureau so that anyone confronting the problems of deafness might be assured of help. Advice is given as to schools and preschool training, lip reading instruction, hearing aids,

social contacts, psychological difficulties. While the Volta Bureau is not equipped to do employment service, it gives information in regard to the fields of activity that are open to the deaf and the hard of hearing.

The Volta Review,, a magazine for parents and teachers of the deaf and for the hard of hearing, is on the reading table of many physicians. Pamphlets dealing with all phases of deafness, except medical problems are available to all who ask for them. Lists of such pamphlets and sample copies of the magazine will gladly be sent free of charge. The Volta Bureau is located at 1537 35th St. N. W., Washington, D. C.

ANNUAL MEETING OF THE INTER-STATE POST GRADUATE MEDICAL ASSOCIATION OF NORTH AMERICA

The International Assembly of the Inter-State Postgraduate Medical Association of North America, under the presidency of Dr. David Riesman of Philadelphia, Pennsylvania, will be held in the public auditorium of St. Paul, Minnesota, October 12, 13, 14, 15 and 16 with pre-assembly clinics on Saturday, October 10 and post-assembly clinics, Saturday, October 17, in the hospitals of St. Paul.

The aim of the program committee with Dr. George Crile as chairman is to provide for the medical profession of North America an intensive postgraduate course covering the various branches of medical science. The program has been carefully arranged to meet the demands of the general practitioner, as well as the specialist. Extreme care has been given in the selection of the contributors and the subjects of their contributions.

In cooperation with the Minnesota State Medical Association, the Ramsay County Medical Society will be host to the Assembly and has arranged an excellent list of committees who will function throughout the Assembly.

A most hearty invitation is extended to all members of the profession who are in good standing in their State or Provincial Societies to be present and enjoy the hospitality of the medical profession of St. Paul. A registration fee of $5.00 will admit each member of the medical profession in good standing to all the scientific and clinical sessions.

A list of the distinguished teachers and clinicians who will take part on the program will appear in the September issue of this JOURNAL.

Special railroad rates will be in effect.

For further information write Dr. W. B. Peck, Managing-Director, Freeport, Illinois.

IMPRESSIVE STATEMENTS

The application of continuous mild suction to an indwelling tube in the stomach or duodenum can drain the intestinal tracts as far the ileo-cecal valve.—The British Medical Journal, May 9, 1936, Page 930.

An unusually high total leucocyte count early after occlusion is thought to be of serious significance.—The American Heart Journal, May, 1936, Page 590.

Essential hypertension often exhibits an early variable stage, responding readily to simple medical measures, difficult to distinguish from vasomotor instability and simple emotional or functional disorders.—N. E. Journal of Medicine, May 21, 1936, Page 1022.

In the present day depression the nutritive state of the American school child has not suffered . . . the general population as a whole seems to be as well nourished as formerly.—J. A. M. A., May 30, 1936, Page 1869.

In cases of chronic trauma to joints, symptoms may develop so slowly that their connection with the trauma may be overlooked and well advanced articular lesions may remain symptomless until some unusual strain is experienced.—J. A. M. A., May 30, 1936, Page 1900.

Improper surgical masking has constituted a persistent weak link in the chain of aseptic operative technic. —American Journal Surgery, June, 1936, Page 477.

Prostatitis and spermatocystitis have come into prominence as foci of infection in the past ten years, and medical men no longer expect a history of gonorrheal involvement when such foci have been found associated with remote disease.—Urologic and Cutaneous Review, June, 1936, Page 379.

There is relatively little difference in the mechanism of the respiratory reflexes of coughing and sneezing. Sneezing taking the place of coughing in pertussis is so characteristic that the diagnosis may be made instantly. —The Journal of Pediatrics, May, 1936, Page 583.

Solution of potassium arsenite is apparently an effective palliative agent in the treatment of chronic myelogenous leukemia.—Annals of Internal Medicine, May, 1936, Page 1501.

Liver therapy should be used routinely for roentgen sickness.—The American Journal of Roentgenology and Radium Therapy, May, 1936, Page 687.

If certain criteria are rigidly observed in each individual case, birth control based on the safe period can be employed with a reasonable measure of certainty.—The British Medical Journal, May 30, 1936, Page 1094.

Convalescent measles serum given just before and within six days after exposure usually prevents the disease; serum between the sixth and tenth days as a rule modifies the severity of the infection; serum given after the onset of the infection, (most frequently on the tenth day), is without beneficial effects.—Annals of Internal Medicine, May, 1936, Page 1471.

The extreme subdivisions (in this textbook on surgery being reviewed) shows how specialized is surgery in America today. There are separate authors for femoral and inquinal hernia; five deal with the rectum, and seven with the stomach. No less than nineteen authors write on fractures of the limbs. One gathers that the one who describes fractures of the shaft and upper ends of the tibia and fibula is not considered so great an authority on fractures of the lower ends of these bones; the cooperation of two experts has been deemed necessary on the question of fractures near the elbow joint.—The Lancet, May 30, 1936, Page 1242.

It seems logical to assume that the virus of poliomyelitis, by the time signs and symptoms of the disease become obvious in infected human beings, has already reached practically all of the nerve cells that are likely

to be attacked. One would expect convalescent serum given after the onset of signs of the disease to be valueless. Such expectations are in accord with the clinical findings reported by careful workers.—Annals of Internal Medicine, May, 1936, Page 1473.

There are scare-words which, when carelessly applied to a patient, make him anxious and apprehensive. And there are comfort-words, expressions which, coming from a trusted physician, banish fear. By use of these symbols the nervous system can be played upon as though an instrument. The charlatan employs them to establish conditions which he can capitalize for his own profit. The wise doctor knows how to use them as a part of his therapy.—Annals of Internal Medicine, May, 1936, Page 1461.

OPTOMETRY: CORPORATE PRACTICE OF OPTOMETRY ILLEGAL IN ARIZONA; INJUNCTION TO RESTRAIN PRACTICE

The Funk Jewelry Company, a corporation, employed a licensed optometrist to examine eyes and to prescribe glasses. The state of Arizona, on the relation of the attorney general, instituted action to enjoin the corporation from practicing optometry. From an adverse judgment in the trial court, the corporation appealed to the Supreme Court of Arizona.

The optometry practice act, said the court, prescribes certain qualifications to be possessed by applicants for licenses to practice optometry. These qualifications necessarily exclude a corporation from practice. It cannot qualify. It does not possess the necessary moral and intellectual qualities. The corporation, therefore, when it employed a registered optometrist as a part of its business to examine eyes and to prescribe glasses, violated the optometry act. It was apparently contended, however, that even though the corporate practice of optometry was illegal, an injunction would not lie to restrain that practice. The optometry act, observed the court, prescribes no punishment for those who violate its provisions. Consequently, the ordinary criminal sanctions, such as fine and imprisonment, are not available to prevent continued violations of the act. Unless the writ of injunction is available, there is available no remedy to enforce the act. Furthermore, the court continued, while the civil process of injunction may not ordinarily be used to prohibit persons from committing a crime, where the crime is a public nuisance or affects the interests of the state, injunctions will lie. *State* v. *Smith* (Ariz.), 29 P. (2d) 718, 31 P. (2d) 102, 92 A. L. R. 168. The tendency is to grant injunctions to prevent unlicensed persons from practicing the professions. If the present action, said the court, had been brought by the state board of optometry or by members of the optometry profession, there would be no question of their right to maintain the action, in view of the trend of judicial opinion. The present action, however, was brought by the state, on the relation of the attorney general. The optometry act, continued the court, was passed for the general welfare of the people of the state. Its purpose is to protect the health of the people, and, while the state may not have any pecuniary interest in the enforcement of the act, it has a very much higher interest, and that is in the protection of the health and well being of its people. That being the case, it seemed to the court that the state, acting through the attorney general, could lawfully apply to the courts to exercise their equity powers to enjoin violations of the act.

The corporation apparently further contended that the state board of optometry had entered into some kind of an agreement with the licensed optometrist whereby the board agreed that the optometrist might render the services for which he was employed for a limited length of time. Such an agreement, the court said, would not have the effect of suspending the requirements of the optometry act. Furthermore, the agreement did not purport to authorize the corporation to practice optometry, and if it had, the agreement would have been void.

The judgment of the trial court, granting the injunction was therefore affirmed. (*Funk Jewelry Co.* v. *State ex rel. La Prade* Ariz.), 50 P. (2d) 945.)—*Medicolegal Abstract, Journal of the American Medical Association.*

COMPENSATION OF PHYSICIANS: LIABILITY OF THIRD PERSON FOR MEDICAL SERVICES

The plaintiff, a physician, sued the defendant to obtain payment for medical services rendered a Negro employee of the defendant. The Negro, suffering from a gun-shot wound, was taken to a hospital owned and operated by the plaintiff. Immediately thereafter the defendant came to the hospital and, according to the plaintiff, said: "If you will go ahead and take care of the case, I will pay the bill." The testimony of several witnesses tended to corroborate the plaintiff. The defendant, however, denied that he had made the promise just noted and, from a judgment for the plaintiff, he appealed to the Supreme Court of Oklahoma.

The Supreme Court, however, believed that the evidence reasonably tended to support the verdict of the jury. In *May* v. *Roberts*, 28 Okla. 619, 115 P. 771, relied on by the court in the present case, the plaintiff, a physician, brought suit for services rendered the wife of the defendant's tenant. The defendant had requested the physician to visit the tenant's wife and told him that he would see that the bill was paid. Such evidence was held to be competent and material and to establish a primary liability not within the statute of frauds. Finding no error in the record in the present case, the Supreme Court affirmed the judgment in favor of the physician. (*Gloeckler* v. *Weedn* (Okla.), 50 P. (2d) 634.)—*Medicolegal Abstract, Journal of the American Medical Association.*

A SCHOOLBOY'S EXPLANATION

Water is composed of two gins, Oxygin and Hydrogin. Oxygin is pure gin, Hyrogin is gin with water in it.

Original Articles

A CRITICAL REVIEW OF 822 OPERATIONS ON THE ADRENAL SYMPATHETIC SYSTEM WITH SPECIAL REFERENCE TO ESSENTIAL HYPERTENSION

(From Stenotype Notes)
GEORGE W. CRILE, M. D.
CLEVELAND, OHIO

Mr. Chairman, Ladies and Gentlemen: It is my pleasant duty to acknowledge the great pleasure it is for me to appear once more before this audience. My principal thesis will be an attempt to suggest a background for the genesis of hypertension.

I propose as my major premise, that essential hypertension is an example of pathologic physiology of the adrenal medulla-sympathetic complex. As evidence, in support of this premise, it must be shown what this pathologic physiology is and there must be offered evidence that there are other types of pathologic physiology that are analogous to essential hypertension. Then I must offer evidence that we do know what mechanism has the greatest control of blood pressure. I must show that in nature the mechanism that has the power to affect blood pressure varies in size and complexity in different types of animals, and finally, the effects upon hypertension of interference with the adrenal sympathetic system must be offered in evidence.

How shall we define pathologic physiology? Pathologic physiology is a non-adaptive excessive activity of an organ which is functioning normally. The only tissue that, in my opinion can exhibit a pathologic physiology is nerve tissue because pathologic physiology is that state in which the mechanism is set in motion, non-adaptively, at a level above the normal limit. The mechanism cannot stop and re-adjust itself. It is as if one set his automobile at high speed and then found he could not again bring it back to the normal rate or stop its running; that would be a pathologic physiology. It is clear that pathologic physiology can only concern a tissue that can be conditioned in Pavlov's sense. The only tissue that can be thus conditioned is nerve tissue. Bone, muscle, skin or the digestive tract cannot be conditioned, or changed so that it will act in this way or in that way or repeat its action. That can be done only by nerve tissue. Pathologic physiology, therefore, involves nerve tissue. In accordance with this conception essential hypertension is a pathologic physiology of the nerve tissue in that mechanism which presides over the genesis of increased blood pressure.

We all know that in research in any branch of science it is not often that we can find the exact proof of any conception or theory. We depend very largely upon analogies and parallels. Therefore, of the analogies and parallels to hypertension which might be offered I shall first cite Raynaud's disease. Until recently Raynaud's disease was a mysterious disease; it was not understood and was incurable. Then it was found that Raynaud's disease was a pathologic physiology of that part of the sympathetic nervous system that presides over the arteries in the extremities—a continuous, sustained and unadaptive contraction of the arteries of the extremities due to a conditioning of the lumbar and the dorsal ganglia which preside over those arteries. These little power plants continue to manufacture energy constantly and unadaptively. When these ganglia are removed then the blood vessels dilate and Raynaud's disease is abated or cured.

I am proposing that essential hypertension is an example of a universal Raynaud's disease. If we can think of a universal contraction of all the blood vessels of the whole arterial tree in the same sense that the arteries of the extremities become contracted in Raynaud's disease then we can see that there would result a continuous, sustained high blood pressure just as there is a continuously cold extremity with gangrene in Raynaud's disease. When the pathologist examines the ganglia which have been removed in Raynaud's disease, as the result of which removal the disease is cured, he does not find any lesion.

Exophthalmic goiter or hyperthyroidism presents another analogy to hypertension. Those of you who are not familiar with this disease will be greatly surprised to find, as we did, that hyperthyroidism is due to a pathologic physiology. For a long time there has been a great deal of discussion as to the nature of hyperthyroidism. It became clear to many observers that the thyroid gland could not set up in itself

*Oration in Surgery, Eighty-sixth Annual Meeting, Illinois State Medical Society, Springfield, May 20, 1936.

a pathologic physiology manifested by excessive activity but that the stimulating energy must be brought to the thyroid gland causing it to become hyperactive. There is no more possibility that a gland could by itself or from a force within itself set up an increased activity, than that a motor car could start itself and by itself take a trip downtown. We must detach ourselves from that vitalistic idea.

I believe that the symptoms of hyperthyroidism are the result of excessive activity of the adrenal glands and the sympathetic nervous system, and that the thyroid gland has nothing to do with it. In regard to those cases in which hyperthyroidism recurs in spite of repeated operations we may say that if it is true that there is present a pathologic physiology of the sympathetic nervous system then it is that pathologic physiology which throws the thyroid into this state of pathologic activity because there is nothing wrong with the thyroid secretion except that there is too much of it. It follows that if we should denervate the adrenal gland and break up some part of the sympathetic plexus we should abate or cure hyperthyroidism. We have now performed this operation on 119 patients with recurrent hyperthyroidism, and for one reason or another, in primary cases in which there has been an associated disease like diabetes or hypertension. In these cases the thyroid gland has not been touched at all. The denervation of the adrenal gland abates the disease with certainty. The origin of the disease was in the sympathetic nervous system and, of course, the medulla of the adrenal gland is part of the sympathetic nervous system. In all these cases the disease was abated or cured; the symptoms disappeared, the increased metabolic rate disappeared, the size of the gland receded to normal and increased activity disappeared.

A third analogy to the pathologic physiology of hypertension is presented by neurocirculatory asthenia. This disease occurs, just as does hyperthyroidism, in the highly intelligent fraction of our citizens, which means that the entire sympathetic nervous system is at a abnormally high level of activity. In France we saw cases of this disease which we called "soldier's heart." Those of you who followed the progress of that group of cases will remember that they resembled cases of hyperthyroidism, except that there was no exophthalmos and an increased basal metabolic rate was rarely present. These patients had tremor, nervousness, tachycardia, fatigue, exhaustion, excitability and dilated pupils. All that is necessary in making the diagnosis of neurocirculatory asthenia is to consider the functions of the sympathetic nervous system, and call the roll. In 154 cases of this disease, and a large percentage of these patients were sent to us as examples of one degree or another of hyperthyroidism, the disease was specifically relieved by sympathectomy of one type or another, for denervation of the adrenal glands or breaking up the plexus itself interferes with the power station, the activity of which drives the system to increased activity.

In well developed cases of neurocirculatory asthenia, we often see the pounding heart and the tachycardia cease while the patient is on the operating table as soon as the division of the sympathetic nerves has been made. While the patient is on the table the cold, sweaty hands and feet become dry and warm just as after the operation of ganglionectomy for Raynaud's disease the hands and feet become warm and the sweating disappears while the patient is still on the operating table.

Let us now apply this principle of pathologic physiology in the energy system of the body to essential hypertension. A study of the comparative anatomy of various types of animals gave us a background for an understanding of the energy characteristics of man. If our conception regarding the rôle of the sympathetic system is true then we should find as great a difference between the energy controlling mechanisms of different types of animals as the engineer can find between an airplane engine and a tractor engine. By the energy controlling mechanism we mean the special senses, the brain, the thyroid gland, the adrenal medulla and the sympathetic complex. These are the tissues that mediate between the external and the internal environment. The energy controlling mechanism is the only mechanism that has the power of changing the status of the oxidation. What would an engineer do, if he were to design an animal, which would depend as completely on oxidation for energy as the combustion engine depends on oxidation for energy? If he wanted to make an animal that had sustained activity like the human being, what would he do? He would design a gland which would have the

power of maintaining the energy at a constant level day and night, namely, a thyroid gland. Then if he wanted to make an animal that was very bright, very quick and very powerful, he would build a mechanism that would respond adaptively to the demands of the moment, namely, large adrenal glands and a large and complex sympathetic system. Therefore, it was necessary for us to find in the animal kingdom by studies of comparative anatomy whether or not Nature, the greatest engineer, had done this.

Before describing these studies let me take up one more important point. T. R. Elliott and others have shown that the sympathetic nerves produce a substance which has been called sympathin. This substance has the same power of effecting quick oxidation that adrenalin has, perhaps even more. It should be remembered, however, that the sympathin that is produced within the nerve fibers of the sympathetic system does not pass into the circulation as adrenalin does but acts within the nerve fibers themselves.

With this in mind, let us consider the equipment for the production of energy in those powerful animals which manifest great outbursts of energy. One would expect to find that in such animals the most efficient and largest possible mechanism for "flashing" the circulation of the blood has been built up. It is necessary, moreover, not only that there be a mechanism for speeding up and forcing the circulation but that this mechanism be correlated with a mechanism for increasing the supply of oxygen and we would expect to find, therefore, that the larger the adrenals and the more complex the sympathetic system the greater would be the capacity of the heart and the lungs.

To discover whether or not this conception was valid the Cleveland Clinic Foundation, the Cleveland Museum of Natural History, and the Department of Comparative Anatomy of Western Reserve University first studied many varieties of animals in North and South America.

Later in order to study the greatest possible variety of animal life in the world in its natural habitat we organized an expedition which went into Tanganyika Territory in Africa last winter. There we set up a laboratory in the field so that the animals could be examined immediately after they were killed. We collected 220 different animals. We weighed them as a whole and weighed every organ and made comparative anatomy studies, comparing these findings with those in the animals examined in our former studies.

We have determined the ratio of the weight of the adrenal glands to the whole body weight. In the alligator, for example, this ratio was 1:280,000. The alligator has no sympathetic complex having only a simple nerve supply of the adrenal glands. Then we have studied the opposite order of animals, those that exhibit the largest outbursts of speed such as the lion and the tiger. We found as we expected, a mechanism in the lion and the tiger which differed entirely from that found in the alligator. The adrenal-body weight ratio, instead of being 1:280,000 as in the alligator was only 1:11,000 in the lion. The alligator, crocodile and reptiles have a very small adrenal gland and no sympathetic complex and, therefore, they could not play the rôle of the tiger or lion any more than a tractor engine could play the rôle of an airplane engine. Not only do the lion and the tiger have big adrenal glands but there are so many ganglia in the sympathetic system that they resemble a cluster of grapes.

We know that sympathin is secreted by these nerve fibers and the ganglia. Impulses come from the brain down into this system which cause a flash of oxidation. What does that flash of oxidation do? It is clear enough that it puts its energy into the sympathetic nerves, and thus speeds up the oxidation in the nerves of the entire arterial tree, for from this power plant, the sympathetic complex, many branches pass into the aorta from which the nerves pass to the smaller arteries and thence to the arterioles and the capillaries. It is just as in a lighting system, somewhere there is a power plant and there is no break in continuity from that power plant to the light.

We have now performed 874 operations upon this sympathetic complex or upon some part of this generating system for various diseases which we believe to be due to a pathologic physiology of this system. We have included essential hypertension in this group of diseases. We early discovered a very interesting fact, however, which is that there is more than one phase to the action of this energy plant, for whereas denervation of the adrenal glands relieves hyperthyroidism and neurocirculatory as-

thenia, it does not permanently relieve hypertension. The denervation of these glands does have a temporary effect upon hypertension and so does unilateral adrenalectomy. But the blood pressure tends to return to its former level. In any case, a direct attack upon the adrenal gland would seem to be contraindicated because if too much adrenal tissue is excised adrenal deficiency will follow. The early marked effects of these early operations, however, did indicate that the adrenal glands and sympathetic system when in a state of pathologic physiology can affect the energy possessed by the arterial tree from the aorta to the capillary bed. Denervation of the adrenal glands improved the results over those secured by adrenalectomy especially in cases of early hypertension in young subjects, the improvement in some cases having lasted for as long as five years. We also had good results in cases in which the hypertension was associated with some other manifestation of a pathologic physiology of the energy-controlling system such as hyperthyroidism or polyglandular disease but still there were recurrences of the hypertension in many cases. We, therefore, extended the operative procedure to include resection of the major, minor and least splanchnic nerves. This operation improved both the immediate and the later clinical results and in view of the gravity of the disease we felt justified in recommending this enlarged operation especially in view of the fact that headaches and other subjective symptoms were relieved. But it became evident that some other still undiscovered factor in the production of the hypertension must be found.

It was at this point that we grasped the full significance of our studies of the comparative anatomy of the energy-controlling system in man and animals. We realized that the mechanism involved in the production of hypertension must include the extensions of the sympathetic system to the aorta itself.

A significant observation also indicated the function of the sympathetic system in the production and maintenance of high blood pressure. When, in the course of a denervation of the adrenal glands and division of the splanchnic nerves, the sympathetic nerves are manipulated there is a rise in the blood pressure, both systolic and diastolic, sometimes to such a height that it cannot be measured by a manometer, while on the other hand if the field is first flooded with novocain there is no rise but rather a dramatic fall in the blood pressure. The adrenal-sympathetic complex is the only tissue in the body, the manipulation of which can thus specifically affect the blood pressure.

An operative procedure based on this observation and on the findings in our studies of comparative anatomy should enable us to reduce the high blood pressure of essential hypertension to normal on the operating table and since the post-ganglionic fibres cannot regenerate there should follow a corresponding permanent reduction. There should be no disturbance of any other function, renal, bladder, gastrointestinal, etc.; and, of considerable importance, the operative procedures could be completed in one seance.

In accordance with these conceptions we have resected the celiac ganglia, broken up the sympathetic complex and denervated the aorta in 25 cases most of which were cases of malignant hypertension in an advanced stage.

The following observations summarize our experience to date in the surgical treatment of hypertension:

1. As stated above, in cases of early hypertension especially in young subjects the blood pressure falls to the normal level or becomes stabilized at a level lower than the preoperative level.

2. In cases in which the hypertension has been associated with other diseases which are due to a pathologic physiology of the adrenal sympathetic system good results are secured. The hypertension disappears together with the disease with which it is associated.

3. In regard to the more recently adopted procedure described above the following statements may be made:

a. During the operation in cases of malignant hypertension the blood pressure is reduced to or below the normal level.
b. The operation is performed in one seance.
c. There is but a slight degree of shock as would be expected since the operation is retroperitoneal.
d. Since the operation is performed in a painless area nitrous-oxid oxygen provides ample anesthesia.
e. It is still too early to offer any statement in regard to the post-hospital results. We

can say, however, that the clinical results during the post-operative stay in the hospital are better than those secured by our former procedures. During this period the blood pressure is more completely stabilized at a lower level and there is a greater improvement in the eye-grounds and in the kidney function as well as in the general well-being of the patient.

TUBERCULOSIS OF THE KIDNEY IN CHILDHOOD AND ADOLESCENCE

HERMAN L. KRETSCHMER, M. D.
CHICAGO

"The miliary type of tuberculosis seen in childhood as a concomitant to the rupture of a caseous gland in the course of a primary complex is no problem for the genito-urinary surgeon, yet a mechanism of its production is here detailed to clarify the difference in etiological consideration of this type from that above mentioned.

Fig. 1. Showing the presence of tuberculous hydronephrosis with stricture of the ureter below the transverse process of the fifth lumbar vertebra. The right pyelogram was normal.

"The primary tuberculous lesion occurs with increasing incidence after the years of childhood pass. This is the result of a primary tuberculous infection which usually locates sub-pleurally and sets up a focal reaction. An abundance of lymph tissue in early life allows of considerable lymph nodes swelling up and an associated para nodal inflammation occurs along with a stasis in the lymph draining the seat of the infection.

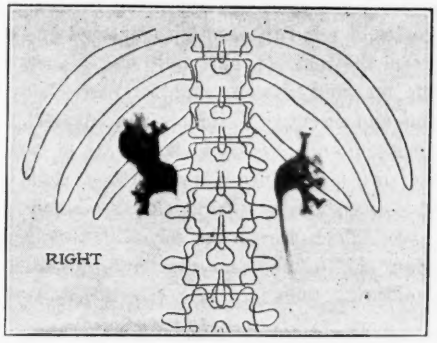

Fig. 2. Intravenous Pyelogram showing a normal pyelogram on the left side and the presence of a cavity on the right side.

"Frequently enough, caseation is the resulting pathological trend in the lymph gland which, having become adherent to the adjacent vascular structures, may break through its limiting capsule. It may thus discharge its caseous contents into the circulation, pulmonary or systemic, to produce the miliary type of disease. This mechanism in later adolescence and adult life is not common."[4]

This paper is based upon a series of 43 cases of renal tuberculosis which occurred in childhood and adolescence. (Adolescence may be defined as that period from fourteen in males

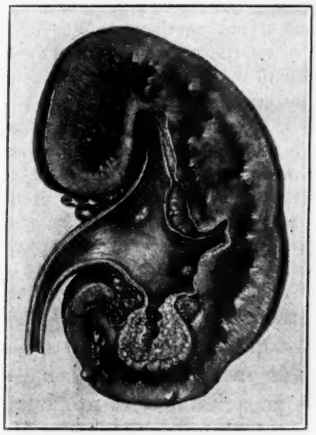

Fig. 3. Showing a large cavity in the lower pole and the presence of a few nodules in the cortex.

From the Presbyterian Hospital and the Children's Memorial Hospital, Chicago, Illinois

Read before the Section on Surgery, 86th Annual Meeting of the Illinois State Medical Society, Springfield, Illinois, May 20, 1936.

and twelve in females to the age of twenty-one.)[1]

The statement that chronic renal tuberculosis is rare in childhood is one that has never been disputed so far as I know and has been emphasized by all authors who have written on this subject. Thus Beer,[2] in reporting his series of 280 cases of renal tuberculosis, reported one case between the ages of one and ten, 7 cases between ten and fifteen, and 22 cases between fifteen and twenty. Wildbolz,[3] in his series of 245 cases, found 17 cases up to the age of twenty.

My own experience with cases of renal tuberculosis occurring during childhood and adolescence, which forms the basis of this paper, consists of 43 cases and they are presented in the following table:

TABLE 1

Age	Males	Females	Total Cases
4 to 10 years.....	1	3	4
11 to 15 years.....	7	4	11
16 to 21 years.....	17	11	28

This shows that 15 cases occurred before fifteen years of age and 28 cases between fifteen and twenty-one.

It is a well-known fact that in infants and children the common tuberculous lesion of the kidney is miliary tuberculosis, but this carries no interest from the urological point of view.

The following paragraphs are explanatory as to the reasons why the occurrence of renal tuberculosis in children is rare:

"Initial or primary infection with tubercle bacilli in the human being results in sensitization after a period of three to six weeks. During this primary development, the organisms may enter lymph channels, penetrate regional lymph nodes, and be disseminated by the hematogenous route throughout the body. The finer capillaries in terminal vascular structures permit of the filtration of these bacilli until the developing sensitization or allergy acts to fix the organisms in situ.

"Thus, if a clump of tubercle bacilli, acting as an embolus, is in the course of passing throughout the finer vascular structure of the kidney after the development of sensitization, it may become fixed—to proliferate later and cause renal tuberculosis. A similar distribution of tubercle bacilli may also occur with a loss of sensitization and development of anergy, permitting of an hematogenous invasion from a dormant or active disease in some other part of the body.[4]

Sex. The question of sex is not an important aid in the diagnosis of renal tuberculosis. Figures for large series of cases in adults vary, depending upon the type of material that the author reports. Naturally, from a gynecological clinic, the female sex would predominate; whereas, in a urological clinic, where mostly male patients come for treatment and operation, the number of males would predominate.

In a previous study[5] based upon 221 cases, including both adults and children, there were 55.6% males and 44.3% females.

In the present series of cases there were 25 males and 18 females, showing a slight difference in favor of males. On the other hand, *in the cases that occurred in children of fourteen years or under there was practically an equal number of males and females* (8 males and 7 females.)

Evidence of Tuberculosis in Other Parts of the Body

A careful history and a complete physical examination may often reveal evidence of a healed tuberculous lesion or perhaps the presence of an active one, either of which should arouse our suspicions, in a patient with urinary symptoms, that the patient may be suffering from a tuberculous lesion in his urinary tract and hence we should direct the examination with the possibility of renal tuberculosis in view.

The history of an attack of pleurisy with effusion or the history of a pulmonary condition that required sanatorium treatment, is of the greatest importance. The presence of enlarged glands or scars in the neck, associated with a history of long-continued suppuration, chronic bone or joint suppuration, or an ankylosed joint is of great importance and deserving of careful consideration in every patient with urinary symptoms or in cases with recurring attacks of pyuria or when silent pyuria occurs, i. e., in cases that persistently have pus in the urine but no urinary symptoms.

In males a most careful examination of the genital tract should be made and, although genital tuberculosis associated with renal tuberculosis in children is rare, nevertheless this fact does not justify failure to examine the genital tract. Examination of this series of cases showed the presence of tuberculous epididymitis or a history of a previous epididymectomy for tuberculosis in 4 cases.

Although a history of antecedent tuberculous disease in other parts of the body does not always mean that the lesion under consideration is a tuberculous one, nevertheless, if we bear these

facts in mind they will often be of great aid in leading to the correct diagnosis. Evidence of suppuration in a bone does not necessarily mean that the bone was the seat of tuberculous disease. That the lesion of the bone may be other than tuberculous and thus may lead to the wrong diagnosis has been my experience in one case, in which the diagnosis of renal tuberculosis was made before operation and at operation actinomycosis was found.[6]

In a certain number of cases data of this sort may be absent. However, may I call attention to the fact that in this series of cases evidence of tuberculosis elsewhere was obtained in 72% of the series.

The interesting thing about this group of patients who had tuberculous lesions outside the urinary tract is the fact that in almost all of them there was more than one distant lesion of tuberculosis. The location of the tuberculous lesions is given in the following table:

TABLE 2

Case No.	Sex	Age	Tuberculous Lesions Outside the Urinary Tract
1	F	4 yr.	Lungs. Hip. Glands in neck.
2	F	7 yr.	Lungs. Spine. Glands in neck.
3	F	9 yr.	Lungs.
4	M	10 yr.	Knee. Hip.
5	M	12 yr.	Hip. Calcified glands in chest.
6	F	13 yr.	Lungs.
8	F	14 yr.	Lungs. Glands in neck.
9	F	14 yr.	Lungs.
11	M	14 yr.	Prostate. Seminal vesicles.
13	M	15 yr.	Abscess in gland in neck.
14	M	15 yr.	Lungs. Calcified glands in chest.
15	M	15 yr.	Prostate. Seminal vesicles. Calcified glands in chest.
16	M	16 yr.	Calcified bronchial glands.
17	M	16 yr.	Lungs. Glands in neck.
18	M	16 yr.	Knee.
19	M	16 yr.	Lungs.
21	F	17 yr.	Lungs. Hip. Abscess in elbow. Glands in neck.
22	F	17 yr.	Hip. Calcified glands in chest.
24	F	18 yr.	Lungs. Calcified glands in chest.
25	F	18 yr.	Lungs.
26	M	18 yr.	Prostate. Seminal vesicles. Calcified glands in chest.
27	M	18 yr.	Lungs. Prostate. Seminal vesicles. Epididymis.
28	M	18 yr.	Epididymis (bilateral).
30	M	18 yr.	Prostate.
31	M	19 yr.	Lungs.
32	M	19 yr.	Prostate. Seminal vesicles. Epididymis (bilateral).
36	M	20 yr.	Prostate. Seminal vesicles.
37	M	20 yr.	Lungs. Prostate. Seminal vesicles. Urethra. Abscess in groin.
39	M	20 yr.	Lungs.
41	M	20 yr.	Seminal vesicles.
43	M	21 yr.	Prostate.

One of the striking things about this series is that in 7 of the cases, 16.27%, there was evidence of tuberculosis of the bones and joints, and in 16 cases, 37.2%, there was evidence of tuberculosis of the lungs.

Location. The question of whether the right side is more frequently involved than the left is of statistical or academic value only. Of greater importance than the question of which side is involved more frequently is the question whether or not there is bilateral involvement, since the presence of bilateral renal tuberculosis renders nephrectomy, with but rare exceptions, out of the question. One of the most important problems in every case of renal tuberculosis, therefore, is to determine the exact status of the opposite kidney with regard to freedom from tuberculosis, as well as to its functional capacity.

Formerly the general opinion seemed to prevail that renal tuberculosis was a unilateral disease. Recently, however, as a result of more careful study of these cases a good deal of evidence has been accumulated which shows that bilateral renal tuberculosis occurs more frequently than was heretofore believed.

My own experience in a previous study[5] of 221 cases showed bilateral involvement in 19.3% of the cases. In a consideration of this question it is important to bear in mind the fact that in some instances an early lesion may have been overlooked in the opposite kidney; hence, figures for bilateral renal tuberculosis are more apt to be too low than too high.

In this series of 43 cases the incidence of bilateral involvement was 37.2% (16 cases).

Duration of Symptoms. It has long been recognized that renal tuberculosis is a chronic disease, that it runs a slow but progressive course, and that many times the disease is very far advanced when the patient presents himself or herself for examination.

The functional result, so far as a return to normal bladder function is concerned, is in most instances directly dependent upon the time that has elapsed since the onset of bladder symptoms and the time that the diseased kidney was removed by nephrectomy. In other words, the patient in whom the diagnosis is made early with only a moderate amount of bladder involvement or perhaps no bladder involvement at all, has a much better end result than the patient in whom

the diagnosis is made late and the bladder tuberculosis is extensive.

A review of the cases in this series was extremely interesting in that, although in some cases the interval between the onset of the symptoms and the time the diagnosis was made was relatively long, ten years in 2 cases, there were a great many patients in whom the symptoms were present for one year or less. The average for this group was one and one-half years.

TABLE 3

Onset of Symptoms	Cases	Percent
Under 6 months	17	39.5
6 months to 1 year	10	23.2
1 to 4 years	12	27.9
6 to 10 years	4	9.3

Symptoms. Although in rare instances urinary symptoms may be absent and in other cases the true nature of the illness may be masked by a superimposed acute infection, the fact remains that in most of the cases in this series bladder symptoms were present and predominated the clinical picture, and it was because of bladder symptoms that the patients were brought in or sought relief.

Some of the patients in this series were treated for various periods of time under the mistaken diagnosis of acute or chronic pyelitis because of recurring attacks of chills, fever, gastrointestinal symptoms and the presence of pus in the urine.

Every case of chronic pyuria that fails to respond to treatment should be given the benefit of a complete urological study to determine the underlying cause, and it is especially in this group of cases that careful and repeated search for tubercle bacilli should be carried out.

Urinary symptoms were present in the largest number of cases; they tend to increase in severity and they fail to respond to medical treatment. Of the various urinary symptoms encountered, frequency of urination heads the list and was present in 37 of the 43 cases (86%).

The *frequency* in most cases is due to the presence of tuberculous ulceration of the bladder and generally means that the renal tuberculosis has been present for a long time. In some cases frequency may be due to the fact that the patient has a contracted bladder, hence a limited capacity requiring frequent emptying.

In some of the early cases without bladder involvement the frequency may be due to a tuberculous pyelitis. And finally, in other cases the frequency may be due to polyuria, it being a well recognized clinical fact that the tuberculous kidney often secretes large amounts of very pale urine, so that the mere increase in the urinary output may be responsible for the frequency.

Nocturia was the next most frequent symptom noted by the patients. It is a well-recognized fact that nocturia in children and young adults is suggestive of renal tuberculosis, other common causes of nocturia being diabetes mellitus and insipidus, and nephritis. Persistent nocturia should always arouse our suspicions; especially if the urine contains pus, should renal tuberculosis be suspected. Nocturia was present in 32 of the 43 cases in this series (74.4%).

The various symptoms present in this series are given in the following table:

TABLE 4

Symptoms	Cases
Frequency	37
Nocturia	32
Hematuria	24
Burning on urination	19
Pain on urination	16
Urgency	10
Fever	5
Enuresis	5
Headaches	5
Dribbling	4
Incontinence	4
Difficulty of urination	4

In a small group of patients there were no urinary symptoms and the diagnosis of urinary tract tuberculosis was established by finding tubercle bacilli in the urine. Especially should one be on the lookout in cases with a history of bone or joint tuberculosis.

It would seem that renal tuberculosis would rarely be confused with gonorrhea, yet in several of these cases a diagnosis of gonorrhea had been made and treatment instituted. Failure of the gonorrheal treatment, as carried out elsewhere, led to a complete urological examination that established the correct diagnosis. As an example of this kind I would like to present the following case:

Case 2. W. G., male, aged eighteen years. Admitted to the Presbyterian Hospital on February 24, 1936.

Complaints on admission were pain and burning on urination, nocturia and frequency, loss of weight, and hematuria.

At the time the patient's symptoms began, he sought relief at another hospital where a diagnosis of gonorrheal urethritis was made and he was sent to a venereal clinic. He denied venereal disease and was sent into the hospital for observation.

The *physical examination* was essentially negative, except for balanoposthitis, palpable glands in the inguinal region, and a hard, nodular prostate.

X-ray examination was negative for stone.

Examination of the urine showed albumin, blood, pus, and red blood cells.

Intravenous pyelogram on the right side showed clubbing of the calyces, dilatation of the pelvis, and dilatation of the upper half of the ureter. The left side was normal.

Cystoscopic examination showed an area of edema in the region of the right ureteral orifice. The left ureter was catheterized without difficulty or obstruction. On the right side the catheter met an obstruction about one inch above the bladder, above which point the catheter could not be advanced.

Urine from the right kidney had 2210 white blood cells, was sterile on culture and positive for tubercle bacilli. Urine from the left kidney had 27 white blood cells, was sterile on culture and negative for tubercle bacilli. Bladder urine had 790 white blood cells, was sterile on culture and positive for tubercle bacilli.

The *blood count* was 3,870,000 red blood cells, 8,600 white blood cells, hemoglobin 72%.

Blood chemistry showed urea nitrogen, 16.7; uric acid, 6.3; creatinin, 1.4; non-protein nitrogen, 36.4.

Operation. A uretero-nephrectomy was done on March 6, 1936. The kidney showed definite evidence of tuberculous disease.

Urinalysis. Routine examination of the urine in all patients with urinary symptoms cannot be emphasized too often, since it gives information of great value. Yet, how frequently one sees patients who have had urinary symptoms for a long time and who have had no, or at best, only a superficial, examination of the urine. Bearing out the statements just made, attention may be called to the results of the urinalysis in this series of cases; for, in each instance the urine showed deviations from the normal, and in 90.7% more than one pathological element was found and in some more than two were found. The most frequently-encountered positive test resulted from albumin in the urine. Blood—either gross, chemical, or the presence of red blood cells—was found in 33 cases. Pus occurred in 41 of the 43 cases.

TABLE 5

Urinalysis	Cases
Pus	41
Albumin	38
Blood	33
Casts	8
No analysis	1

Demonstration of the Tubercle Bacilli. The demonstration of tubercle bacilli in the urine is a relatively simple matter and when found clinches the diagnosis. Examination of the urine for tubercle bacilli should be routine in every case of persistent pyuria in children and adults. In a certain number of cases careful search for tubercle bacilli, either in smears or guinea pigs, is rewarded by demonstrating their presence, often when their presence from the clinical picture is not suspected.

In many of the cases in this group a clinical diagnosis was made before the bacilli were demonstrated in the urine. The advantage of establishing a clinical diagnosis is the fact that it leads to repeated search for the bacilli even when the first reports are negative.

In this series of cases, direct smears were positive in 88.3% of the entire series. In 2 cases the pigs alone were positive (4.6%). It may thus be seen that the percentage of positive smears and pigs together totals 92.9% or, roughly, 93%.

Bacteriology. There is an old clinical dictum that a sterile pyuria means or is highly suggestive of urinary tuberculosis. This, I am sure, is familiar to all. It is a valuable point; however, we must bear in mind that there are exceptions to this rule. A careful review of the records in this series of cases showed that the urines were sterile in 19 cases, or 44.1%. In the following table is given the results of the cultures made:

TABLE 6

Growth of Culture	Cases
B. Coli	9
Staphylococcus albus	9
Staphylococcus aureus	2
Streptococci	2
Streptococci viridans	2
Streptococcus hemolyticus	1
Streptococcus fecalis	1
B. Mucousus Cap.	1
B. Pseudo diphtheria	1

Roentgenography. Roentgen-ray examination of the urinary tract should be carried out in every case presenting urinary symptoms, as well as in every case of pyuria. In cases of renal tuberculosis the examination in the largest number of cases is negative. In some instances it may show an enlarged kidney outline, and occasionally the presence of areas of calcification are demonstrated. According to Braasch,[8] tuberculous shadows may be roughly classified under 3 groups: 1. multiple scattered small areas, 2. single or a few localized areas of one centimeter or more in diameter, and 3. large, irregular, diffuse areas involving either a large portion or the entire kidney. They generally occur in small

clusters and are irregular both in outline and density. Although in rare instances they may be relatively large, at times these shadows are so faint that they may escape recognition unless great care is used in reading the films.

Intravenous urography is especially desirable in infants and children and often gives very valuable information. We have never seen any untoward results in its use in infants and children. It is scarcely necessary to emphasize the fact that great care must be exercised as regards interpretation.

In the majority of cases the diagnosis can be made without resorting to the use of retrograde pyelography. However, in doubtful cases information is obtained that is of great diagnostic value.

Hinman[9] has again called attention to the fact that retrograde pyelography is not without risk and Kearns[10] states that it is needless, unreliable, and dangerous.

Cystoscopic Findings. The cystoscopic findings in cases of tuberculosis of the bladder secondary to renal tuberculosis are well recognized. Indeed, they are so characteristic that the diagnosis of tuberculosis is self-evident. The changes vary in extent and degree and they vary from slight changes around the ureteral orifice to extensive ulcerations; in others, there is extensive involvement of the bladder wall and a contracted bladder, with a limited bladder capacity making cystoscopy difficult and painful, so that in some, sacral or general anesthesia is required. Extensive bladder tuberculosis means far advanced renal disease as a rule, excepting that group in which the bladder involvement is secondary to tuberculosis of the prostate or seminal vesicles.

Catheterization of the ureters is carried out for two purposes; 1. to demonstrate the origin of the tubercle bacilli found in the mixed specimen, whether from one or both kidneys; and 2. to determine the functional capacity of the normal kidney. Occasionally, difficulty may be experienced in catheterizing the ureter of the diseased side because of the presence of strictures of the ureter due to tuberculosis of the ureter.

In 34 cases the cystoscopic examination showed definite evidence of tuberculosis of the bladder, and in the largest number of these cases the tuberculous disease was extensive and very advanced, meaning that there was a long-standing disease of the kidney. In 6 cases that were examined relatively early after the onset of the symptoms the cystoscopic examination was negative, that is, there was no evidence of the tuberculous disease in the bladder. In some of the cases of severe and extensive bladder tuberculosis, catheterization was impossible.

TREATMENT

The treatment of unilateral renal tuberculosis is surgical, after the opposite kidney has been carefully studied as regards its freedom from tuberculosis and its functional capacity.

The usual program employed in the treatment of pulmonary tuberculosis: namely, rest, feeding, fresh air and sunshine, is of no avail so far as affecting a cure for renal tuberculosis is concerned. Attention may be called to the fact that the kidney cannot be put at rest.

Bilateral chronic renal tuberculosis is not a surgical condition. Removal of the more extensive of the two kidneys has no effect on its tuberculous mate. In those rare instances in which a patient suffers from septic manifestations due to a tuberculous pyonephrosis, nephrectomy may be indicated as a life-saving measure even when the opposite kidney is the seat of tuberculosis.

Of this series of 43 cases, nephroureterectomy was carried out in 23 of them. There were no operative deaths.

Attention may be called to the importance of the post-operative program to be carried out after the patient has left the hospital.

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DISCUSSION

Dr. Frank N. Evans, Springfield, Ill.: This subject of renal tuberculosis I think has been beautifully presented by Dr. Kretschmer. I was very surprised at the number of young individuals he had in whom he had

discovered renal tuberculosis. When we consider that 95% of us are infected with tuberculosis before the age of two years, it is surprising that more cases of renal tuberculosis do not occur. It might explain a good many of the recurrent pyelitis cases in children. I know his paper is going to make us recheck more carefully those cases that come back. We were told that the urine in renal tuberculosis was acid. That is not always true. We have all been taught that colon bacillus did not occur until late. Dr. Kretschmer showed a chart in which 19 out of 43 cases had mixed organisms.

I think one should take a little time to make a diagnosis. There are a lot of things you should do. While working out the urine, you should give an intradermal test. You generally get a "plate positive" chest in renal tuberculosis. There are a few cases of non-specific urethritis that have been reported as being tubercular. I read about six weeks ago an article in which the man reported five or six cases which proved to be tuberculous. It is just a little thought regarding so-called non-specific urethritis.

LOW DOSAGE IRRADIATION OF THE PITUITARY AND ADRENALS FOR THE TREATMENT OF NON-NEPHRITIC HYPERTENSION

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Non-nephritic and essential hypertension are not good terms for this condition as they only call attention to our ignorance. While hypertension may exist without demonstrable arteriosclerosis or nephritis, if the hypertension is not checked, sooner or later both of these conditions appear. Whether they are the result of the long continued hypertension or of the same etiological agent which initiates it has not yet been determined.

Adson[1] says that "etiologically, essential hypertension is probably due to a fault in the neurogenic-endocrine vascular mechanism." Placing the responsibility on a "neurogenic-endocrine vascular disturbance" may be more comprehensive than allocating all of the blame to the pituitary and adrenals, but it should be remembered that these two are more intimately related to, and exert more influence upon, the autonomic system than any of the other endocrines. There is a voluminous mass of literature supporting the idea that the pituitary and adrenals are responsible for this syndrome. Most of this evidence is presented as favoring the view that one or the other of these structures is at fault and takes no notice of the fact that they are so intimately related that one could hardly be involved without implicating the other. The high points in this evidence may be briefly summarized as follows:

1. Both glands normally elaborate a secretion which increases blood pressure and blood sugar.

2. Hyperfunction of the pituitary, whether associated with eosinophilic or basophilic adenoma, is frequently accompanied by hypertension and hyperglycemia.[2]

3. Kylin[3] demonstrated a parallelism between the amount of gonadotropic principle excreted in the urine and the height of the blood pressure. It is true that Scarf and Israel[4] proclaim their inability to verify Kylin's findings, but in most of their cases one could doubt the accuracy of their diagnosis of essential hypertension.

4. Kraus[5] found an increased number of basophils in the pituitaries of patients with hypertension. This finding has been confirmed by others.[6, 34] Its significance, however, is questioned.

5. Hypophysectomy is followed by low blood pressure, low blood sugar, increase in glucose tolerance; clinical hypo-pituitarism is associated with the same phenomena in lesser degree. The same is true of hypoadrenia.

6. Schaefer[7] reports a series of cases of hypertension developing at the menopause which were relieved by injections of theelin. This substance probably has a depressing action on pituitary and adrenal function as indicated by the work of Barnes, Regan and Nelson,[8] Mazer[9] says: "The symptoms of the menopause, other than cessation or irregularity of menstruation, are eminently pituitary, thyroid and adrenal in origin, coupled with a marked instability of the autonomic nervous system."

7. Tumors of the adrenals, presumably accompanied by hyperactivity, are associated with hypertension[10-13] and hyperglycemia.[14, 15] Those involving the medulla are thought to be associated with the paroxysmal type of hypertension, while adenomas of the cortex are reported to be accompanied by constant hypertension. It should be recalled that a syndrome closely resembling

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pituitary basophilism has been found in association with adenomas of the adrenal cortex.[16]

8. Increased amounts of adrenalin are said to have been demonstrated in cases of essential hypertension.[17]

9. There is an increasing appreciation of the effects of emotion on hypertension. It is almost certain that the evil effects of emotion are mediated through the adrenals via the sympathetic nervous system. Sullivan[18] includes essential hypertension among the psychosomatic disorders.

There is evidence that a disturbance of carbohydrate metabolism occurs in a considerable percentage of victims of hypertension.[19, 20] In this series we have done glucose tolerance tests on 93 patients. Of these, 58 patients exhibited a high sugar curve during the test. Glycosuria occurred in only a few cases. More than ten per cent. of our patients had both hypertension and diabetes. In some cases the diabetes came first and the hypertension later and in others that order was reversed. Davis[21] questions whether the pancreas has an independent control of carbohydrate metabolism and thinks it would be strange if nature gave exclusive control of such a vital function to one organ. There is abundant evidence that pituitary and adrenals play an important part in carbohydrate metabolism.

The treatment of this series of cases was begun in the belief that essential hypertension and diabetes were due to some functional abnormality of the pituitary or adrenals or both, which could be corrected by very small doses of the x-ray. The harmlessness of the procedure had been demonstrated, long before we used it, by the much larger doses used in the treatment of pituitary tumors without any damage having been reported to the intracranial structures. Pfahler and Spackman[22] gave to a girl 8½ years of ago 4000 R measured in air between May 9, 1930 and June 25, 1931. A man was given 2000 R within a period of one month. The experimental physiologists had used many times the dose we employ, concentrating them on one adrenal after removal of the other, without damage.[23] The doses we use in this work are even smaller than those employed by the dermatologists.

Both sides of the pituitary and the adrenals are irradiated at each treatment. The results are better than when only one structure is irradiated at a time. The present factors are as follows: 120 kilovolts, 3 milliamperes, 2 mm. aluminum filter, 50 cm. skin target distance, 5 minutes, delivering 50 R units. Each side of the pituitary is treated through a portal 10x10 cm. and the adrenals through a common portal 15x15 cm.

In a few instances we used larger doses consisting of the following factors: 180 kilovolts, 6 milliamperes, 1 mm. aluminum and .25 mm. copper filter, 50 cm. skin target distance, 15 minutes, 199.5 R units. While this is not a heavy dose, it was almost invariably followed by an unpleasant reaction characterized by headache, vertigo, weakness and occasionally nausea. In only one or two instances was any appreciable effect on the blood pressure noted. Not only are small doses safer but they are much more effective. Doses large enough to be dangerous are ineffective. This is true not only in our work but also in that reported by others.[24] Men who have reported using this therapy without success have in every instance that has come under my own observation used large doses or repeated the treatment too frequently.

Harrison,[25] discussing the fall in blood pressure noted after irradiation of the parotid sinus, says: "Should the dose be excessive an increase instead of a diminution in the hypertension occurs, but when the proper dose is administered the blood pressure falls shortly after treatment and the fall continues to increase for the succeeding 24 hours. The action is due probably to the effect which the carotid sinus has on the secretory function of the adrenals."

During the progress of this work Barnes[26] studied the effect of irradiation of the pituitary and adrenals on the carbohydrate metabolism of pancreatectomized dogs. He showed that this procedure was regularly followed by an improvement in carbohydrate tolerance in these totally diabetic dogs. Their insulin requirement was reduced about fifty per cent. Barnes is of the opinion that irradiation of the adrenals was the most effective part of the procedure in such instances.

This effect cannot be regularly duplicated in human diabetics. About one-third of our cases appeared to benefit in no way from irradiation;

another one-third noted symptomatic improvement with but little change in their carbohydrate tolerance; while the remaining one-third experienced symptomatic relief and marked improvement in their carbohydrate tolerance. The response of the human animal did not occur with anything like the regularity noted in dogs.

Our experience in the treatment of patients having both hypertension and diabetes is exhibited in Table 1.

TABLE 1.

Both conditions improved	7
Hypertension improved	8
Diabetes improved	5
Insufficient treatment	7
	27

Of the 20 patients to whom we were able to give an adequate amount of treatment, 7 exhibited improvement in both conditions, 15 experienced improvement in the hypertension and 12 experienced a notable improvement in their diabetic state.

Our experience in the treatment of patients with hypertension alone is summarized in Table 2.

TABLE 2.

Improved	123
Unimproved	53
Insufficient treatment or can't be followed	59
	234

A number of men in other parts of the country have used this therapy in hypertension. Their reports which were kindly sent me are summarized in Table 3.

TABLE 3.

	Cases	Cases Improved
Martin	100	80
Baker	40	30
McGuffin	40	30
Finch	12	9
Konantz	6	3
Parkhurst	5	3
Hadley	4	4
Miscellaneous	56	47
	263	206

By improved we mean not only symptomatic improvement but a reduction in blood pressure readings from 25 to 100 points. As has been stated elsewhere,[35] in some cases the systolic is much reduced while the diastolic is but little changed. In others this is reversed; the systolic shows but little change, while the diastolic falls to approximately normal figures.

In some cases a few treatments appeared to be sufficient; in others there was no response until after a number of treatments had been given. In a few there has been no response at all. Another group appeared to need further treatment at irregular intervals in order to maintain their blood pressure at desirable levels.

The only surgical procedure which seems to offer more hope than irradiation is splanchnic section with removal of the first and second lumbar ganglia and partial section of the adrenals. Undoubtedly some cases of hypertension are associated with adenomata of the adrenals. Such cases would be better served by the operation just mentioned. We believe that such cases can now be recognized with a sufficient degree of certainty to warrant referring them to the surgeon. The following indications point in that direction:

1. Malignant hypertension. (This should always arouse that suspicion).
2. Hirsutism in females. Such women usually have a very heavy head of hair, which is coarse and harsh.
3. Menstrual disorders, particularly amenorrhea or dysmenorrhea.
4. Retinal lesions.
5. Small sella.
6. Young patients.
7. Slight response or lack of response to small doses of irradiation.
8. Intravenous urography would offer some evidence if the adenoma was of sufficient size.

A patient presenting these signs and symptoms should very seriously consider an exploration of the adrenals with the thought that adenomata may be discovered and removed.

An example of this was Mrs. O, aged 41 years, referred by Dr. G. G. Dowdall. Her hypertension had been discovered four years previously during the latter months of pregnancy. She had four living children aged 4, 15, 19 and 21 years. The menstrual periods began at 14, were still occurring regularly at 28-day intervals, lasted 4 to 5 days and were not accompanied by pain. Past and family history was otherwise without significance.

Temperature 99.6; pulse 100; blood pressure 260/145. Her complexion was florid. She had a heavy hair suit, heavy eye brows, male type of pubic hair and considerable hair about the nipples, chin and upper lip. Her eyes were prominent. The conjunctivæ were inflamed. The B.M.R. was minus 5%, although the picture was highly suggestive of hyperthyroidism and that diagnosis was tentatively made at the hospital.

There was little response to x-ray treatment the few months she was under observation. One year later when she again came under observation her blood pressure was only slightly lower than when she was first seen. The

B.M.R. was plus 55%. She died on January 15, 1936, of myocardial failure. The autopsy showed multiple cortical adenomas of both adrenals, hyperplasia of the hypophysis and thyroid. This woman had much heavier doses of irradiation than are ordinarily employed. There was no sign of x-ray damage to the pituitary or adrenals.

Adson[1] and Peet[27] have noted the same phenomenon following their operations that we have noted following irradiation; the symptomatic improvement is out of proportion to the drop in blood pressure. We have noted symptomatic relief even when there was little or no drop in blood pressure. If there was a secondary rise in blood pressure, this was many times not accompanied by any return of symptoms.

The surgeons noted improvement in retinal lesions, particularly spasm of the arteries. This has also been observed following irradiation, as exemplified in the following case history:

Mrs. B, referred by Dr. John F. Krumm, was 40 years of age and had known of her hypertension for about 10 years. She complained of violent headaches and blurred vision and had had two light strokes during which her speech was affected. She was admitted to the hospital a few days after the occurrence of the last stroke, at which time her vision was so poor that she was unable to read the newspaper, even with glasses. There was general weakness with inability to walk. Her blood pressure was 240/150 right and 236/146 left. Her eye condition was reported by Dr. Hiram J. Smith as showing perivascular hemorrhages, cotton wool exudates, especially about the macular region and near the disc, "a typical picture of cardiovascular fundus, neuroretinitis." After three treatments she was able to read with the aid of glasses, and her speech returned to the point where there was only a slight slurring. Her renal function on admission showed a return of 30% of the dye in 2½ hours. After a few treatments the dye excretion amounted to 60% in 2 hours. The last blood pressure reading was left 180/115 and right 200/125. She was able to read fine print without glasses. She states that as her blood pressure rises her vision becomes more impaired.

Even when no retinal lesions are observed, hypertension patients are troubled at times by blurring of vision. This symptom is almost invariably relieved.

Adson[1] notes that patients developing symptoms in the third and fourth decades of life and belonging to the class of benign or early malignant hypertension respond more favorably to surgical procedures. This is not entirely true in our series, as we have had very favorable results in patients who developed hypertension in their sixties. Their symptomatic relief and fall in blood pressure was quite equal to that seen in younger patients. Some of our most unfavorable results have occurred in women in their thirties and forties.

An example of this is Mrs. X, aged 34, referred by Dr. Hubert M. English. Her hypertension had been discovered 10 years before. She complained of headache, precordial distress, palpitation and lack of endurance. The blood pressure was 260/155 right and 260/140 left. She had a rather swarthy complexion and a heavy hair suit. The sella was quite small. She had more than twenty treatments. Her last blood pressure reading was 195/105 right and 195/110 left. This shows a considerable reduction, but there was so little symptomatic response that she has never been put on the improved list. It is felt that she offers considerable evidence that her trouble is due to hyperplasia or adenoma of the adrenals.

Peet[28] says that severe kidney damage in the absence of a high non-protein nitrogen is not a contraindication to operation. While this is not a contraindication to x-ray therapy, we do not expect this method of therapy to produce more than symptomatic improvement. The blood pressure may drop considerably, but we seriously doubt whether the course of the disease is materially altered in such cases.

We treated one patient with cerebrospinal lues. He experienced neither symptomatic relief nor fall in blood pressure. Another man had syphilitic aortitis. The blood pressure promptly returned to normal levels after treatment but there was no relief of the symptoms due to the luetic condition.

Naturally the same principles govern the prognosis in this as in other therapeutic measures. The earlier the case is seen and the more persistently and intelligently it is treated, the better the outlook. When a new type of therapy is introduced, it is usually applied first to far advanced and hopeless cases where no reasonable prospect of improvement exists. Some of the failures reported have occurred in such cases.

Undoubtedly some of the phenomena following irradiation are mediated through the autonomic nervous system. The improvement in the texture of the skin could hardly be brought about otherwise. Langer[29] pointed out that irradiation of the sympathetic chain relieved dermatoses of various kinds. He mentioned specifically eczema, pruritus, lichen planus, psoriasis, ichthyosis and herpes zoster. Harrison,[30] in discussing irradiation of the adrenals, lists the following conditions as having been benefited by that procedure; endarteritis oblit-

erans in which gangrene was threatened as a result of spasm rather than of actual occlusion of the vessels; threatened obliteration of the arterial supply of the lower limbs as a result of spasm in association with general diseases such as diabetes; senile arteritis and intermittent claudication; cases of painful osteoporosis. He says that the ability to influence the deposition of calcium in this manner led to the use of this method of treatment to increase the deposit of calcium at the site of old ununited fractures. We noted the healing of a gangrenous area on the toe of a diabetic after irradiation of the pituitary and adrenals.

Nervousness, irritability, tenseness and restlessness are almost invariably relieved. Patients claim that strength and endurance are increased and precordial distress is usually relieved. Many patients say that they are more clear-headed and able to work more efficiently. Dr. H. D. Parkhurst[31] of Utica, New York, quotes one of his patients as saying after x-ray treatment that he could think faster and had more speed in his legs.

A considerably elevated B. M. R. has been noted in a number of cases. These have responded favorably to treatment and the B. M. R. has declined to nearly or quite normal levels. One of these cases had had two subtotal thyroidectomies at intervals of a year and a third recommended just before she came under observation. She had the usual symptoms of hyperthyroidism and a B. M. R. of plus 56%. After six treatments the blood pressure declined from 205/75 to 135/85 and the B. M. R. was plus 18%. At the present time, 17 months after the last treatment, the blood pressure is 155/90 left and 165/90 right. The B. M. R. is plus 14%.

Dr. J. V. Fowler[32] reports the case of a young man who had had a subtotal thyroidectomy in 1926, another in 1927, a third in 1929 and a fourth in 1934. The toxic symptoms promptly reappeared after each operation. Three treatments to the pituitary and adrenals, December 21, 1934, January 7 and 14, 1935, were followed by such rapid and marked improvement that he was able to return to work.

There are certain precautions that should be observed in the use of this type of therapy. Small doses should be used. We prefer to use the technic already described. McGuffin[33] reports favorable results with 200 KV but he delivers only about 50 R units per area treated. Treatment should not be too frequently repeated. If the blood pressure shows a considerable drop after one treatment, another should not be given until either (a) the blood pressure begins to rise, or (b) it is evident by a number of observations at three to four day intervals that no further fall can be expected and the blood pressure has not yet reached a satisfactory level. Treatments should not be administered during or within a week before a menstrual period. Treatments given at such times are almost invariably followed by a rise in pressure and an exacerbation of symptoms, particularly headache.

To repeat, while the symptoms may be relieved, if the hypertension has progressed to the point of nephritis, it is obviously unreasonable to expect any notable reduction in blood pressure or material alteration in the course of the disease, although it is not unusual to note some improvement in renal function following treatment, as indicated in Dr. Krumm's case.

Harrison[30] makes the following statement with which we fully agree: "Irradiation will help to avoid unnecessary operations on the sympathetic nervous system and operative interference should not be attempted until the effect of irradiation has been first definitely established. It is highly probable that the operation will prove ineffectual if irradiation has failed to secure any improvement." We would add that treatment is much more effective when the pituitary is irradiated at the same time as the adrenals.

We are indebted to Dr. Dowdall and Dr. Culpepper for their encouragement and cooperation and we have been allowed to include in this report cases from the services of Dr. LeRoy H. Sloan, Dr. E. C. Olson and Dr. Louis G. Singer.

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DISCUSSION

DR. HERMAN H. COLE, Springfield: Anyone who can offer us anything that will, in some measure, add a few years of life or a few years of comfort to our people above forty who develop these hypertensive diseases, I think should be welcomed with open arms. I feel very sure that our patients of thirty-five or forty, or above forty, who ultimately have trouble of this character or of a similar nature, will certainly welcome such a treatment.

Whether we regard chronic hypertension as a primary disease of the endocrine system, whether we regard it as a combined disturbance of the endocrine system with the autonomic nervous system, or whether we regard it as a capillary sclerosis, or selective nephritis, does not make a great deal of difference, provided we secure results.

As Dr. Hutton has told you, there are probably a great many difficulties in the way of the man who selects his case. Of those we see, there are a good many who have defined sclerosis in the kidneys or definite sclerosis in the peripheral arteries, and in this type of patient one cannot expect the type of result that Dr. Hutton expects.

I have only had a small number of cases treated with this method. Two of those have died, one by stroke and one by the cardiac route. One of them is still under treatment, which leaves three completed cases fit to report. Two of these three are very definitely improved, and I have been highly satisfied with the result. The other I am not satisfied with but there has been symptomatic benefit.

One case in particular which started with a blood pressure of 260/135 has obtained, I believe, one of the most remarkable results that a person could ask for. The blood pressure at the present time, after a year and a half, remains below 200 systolic and below 100 diastolic, with practically all symptoms disappeared. I regard the drop in blood pressure as definitely due to treatment. I do not think it is due to a cardiac failure and all of the symptoms have practically disappeared.

As Dr. Hutton has told you, he is offering this as symptomatic relief, possibly more. I believe it should be welcomed with open arms and tried. Personally, I intend to use a good deal more of it than I have, as the patients come in that I can pick out in which I feel justified in using this method. I sincerely hope that Dr. Hutton will go further with this work and will be able in time to give us something that we can use.

DR. HUTTON: (Closing Remarks): I am glad to have Dr. Cole's report that his patient is still in good condition.

I should like to urge men to interest themselves in this type of therapy. It is as safe as any yet offered. It promises more than any other type of therapy including the surgical procedures. Series of treatments

can be repeated indefinitely if one is not successful. If the patient finally elects to adopt a surgical procedure, nothing has been lost by having used x-ray therapy.

With the number of cases that have been subjected to this type of therapy now running well up toward 600 and with men using this type of therapy reporting about the same experience the country over, it seems fairly certain that about three out of four victims of essential hypertension can expect symptomatic relief and a material reduction in blood pressure from this treatment. It can be given to a patient in or near his own home town; there is no occasion for traveling long distances, for hospitalization or for losing time from work during the treatment. It is simple, safe, convenient and, when used with care and intelligence, promises much for the patient.

A NEW ELECTRIC STETHOSCOPE AND STETHOGRAPH

(Phonocardiograph)
Preliminary Report

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According to the available literature, attempts to amplify and register heart sounds date back to 1856, when Donders[1] suggested a crude method of marking the sounds. Various motives account for the numerous efforts in this field. They may be grouped as follows:

1. Auscultation, which renders an immense service in the diagnosis of heart diseases, has inherent drawbacks of every subjective method of examination. The modern scientific research strives to supplement tests subject to a personal equation by objective methods of precision. Thermometer, sphygmomanometer, hemoglobinometer, basal metabolism apparatus may be cited as examples. In heart disease the situation is complicated by the fact that the customary descriptive terms of various murmurs do not define them in satisfactory manner. Desirability of graphic records becomes obvious.

2. A comparison of records made at certain intervals from the same patient offers an opportunity to study the evolution of the condition and the effect of therapeutic measures.

3. Rare cases can be recorded and compared one with another. An opinion can be formed as to the constancy or variability of certain phenomena.

4. The great didactic value of a sound recording apparatus does not require any explanation. Some devices allow a simultaneous auscultation of the heart sounds by the instructor and the student, so that an immediate comment can be made.

5. Feeble murmurs or those unrecognizable with an unaided ear can be graphically reproduced; for instance, the premature first sound found in hypertension with incipient decompensation.[2] In mitral stenosis frequently no distinct apical diastolic murmur can be heard on account of the low fundamental frequency of the sound.[3]

6. Sound recording devices allow exact determination of time relations between the sounds of the cardiac cycle and also between normal and pathologic sounds. Such analysis, of academic or practical interest, throws light on many obscure problems, such as physical characteristics, mechanism and pathogenesis of abnormal sounds. Sounds of premature contractions and reduplication can be distinguished.[4] The onset of the isometric contraction phase of the systole can be precisely located.[5] Opportunities are offered for chronometric studies, i. e. measurement of duration of sounds and murmurs. Graphic recording allows differentiation of various types of the gallop rhythm; a correct diagnosis is important as various types have an entirely different clinical significance.[6,7,8,9] The importance of the ventricular factor in the production of the auricular phenomenon encountered in the Adams-Stokes syndrome has been demonstrated on the basis of phonocardio-

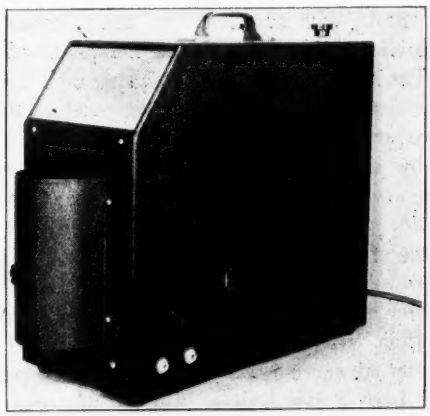

Fig. 1. External View of the Sound Recording Device.

Read before Section on Medicine of the Illinois State Medical Society, Springfield, May 20, 1936.

graphs.[19] The characteristics, mechanism of production and diagnostic importance of the opening snap in mitral stenosis have been studied with the same method.[11] An explanation of the mechanism of the second split sound has been offered.[12] The interpretation of the arterial and venous pressure curves is greatly facilitated by simultaneous recording of heart sounds.[13]

7. An electric stethoscope finds its application in surgery. The heart sounds of the patient can be amplified and made audible or their record visible during operations. Such observations may advantageously supplement the watching of the respiration and blood pressure.

8. In obstetrics the apparatus can be used for an early detection of pregnancy as the fetal sounds and the placental souffle can be greatly amplified. During deliveries the fetal sounds can be made audible by means of loudspeakers or their records can be projected on a screen and watched continuously.[14]

9. Primarily designed for registration of heart sounds, the apparatus can be used also for recording respiratory sounds. Such analyses already furnished practical results by offering suggestions as to the best method of percussion.[15, 16]

10. The device has many other applications. For instance, it enabled a French writer[17] to describe two distinct sounds produced by percussion of the abdomen in ascites. It may be used for investigations concerned with the action currents in muscles or nerves.

To summarize, one may say, that a phonocardiograph has not only a scientific but also a great practical value because it facilitates the diagnosis and prognosis of many conditions and allows a check-up on the therapeutic effects.

The limitations set for this paper do not allow a review of the evolution of the sound recording apparatus. The impetus was given by Einthoven, father of electrocardiography.[18] Greatest strides have been made since the development of the radio. As to the pick-up, soap films, membranes made of collodium, gelatine or rubber have been replaced by carbon, ribbon, moving coil, condenser or crystal type microphones. The amplification was gradually raised to four stages. Lesser advancement can be noticed in the recording part of the devices. Instead of a capillary electrometer, various types of galvanometers or oscillographs are being used and photographic cameras employed. The following countries deserve the greatest credit for development of devices for recording heart sounds: Holland,[18] England,[19, 20] Germany[1, 2, 12, 15, 16, 21] Austria,[22] Hungary,[23] Switzerland, [8, 10] France,[24] Russia,[25] Argentine,[6] Poland[26] and last but not least, our own country.[3, 4, 9, 27-33] This list is by no means complete. All the apparatus are still confined to special research laboratories because they are bulky, expensive, complicated and often inaccurate.

I have the honor to present a new electric stethoscope and stethograph designed and developed by Mr. John Yonkers of Evanston, Ill. This apparatus offers the following advantages:

1. Compactness and small weight. The apparatus is truly portable.

2. Excellent fidelity.

3. Ease in handling. No adjustment, calibration, standardization or focusing is required.

4. Sturdiness, allowing transportation and limiting repairs to a minimum.

5. No batteries. An electric outlet, furnishing an alternating current is sufficient.

6. Low cost of the apparatus and its operation. No darkroom is required for development of films.

7. Direct registration without the use of a photographic camera. Numerous new features are incorporated in the apparatus. A specially designed, so-called contact crystal microphone is superior in many respects to the diaphragm type microphones. It offers the following advantages: (a) Freedom from inherent noises, (b) Excellent frequency response, (c) Extreme lightness of weight, (d) Ruggedness, (e) Where the contact crystal is used audio regeneration is minimized, (f) The contact crystal picks up less outside noise. A specially built amplifier is extremely compact; all frequencies above 2000 cycles are eliminated. This reduces interference from undesired sounds and permits a more perfect recording of heart sounds. The recording heads are of the permanent magnet armature type operating from the output of the two amplifiers, one for the heart sounds, and the other for arterial pressure. The armature has an extended arm fitted with a set screw holder for the stylus. Faithful image of vibrations is furnished by minute excursions of the writing point, thus

overcoming the disturbing features of inertia. The record is made on an uncoated cellulose acetate film. The stylus engraves the record on the surface of the film. The latter is moved by a special synchronous motor maintaining an absolutely constant speed. The optical system throws the enlarged image of the record on a viewing screen on which the time coordinates are marked. Photographic copies of any portion of the record can easily be obtained by simply placing photosensitive paper against the screen. The curve projected on the screen can be observed during the recording process, allowing a selection of the best location for an optimal pressure on the microphone. Headphones permit a simultaneous auscultation by two individuals before, during or after the recording process. Such device is highly desirable for didactic purposes or to overcome difficulties offered to the auscultation with the customary stethoscope: obese patients, impairment of hearing, etc.

The purpose of the apparatus is not to substitute but to supplement the time-honored methods of inspection, palpation, percussion, auscultation, electrocardiography, etc. It is hoped that the phonocardiograph will contribute to the advancement of our theoretical knowledge and will enrich our armamentarium in the fight against heart diseases.

A historical summary, a more detailed description of the apparatus and a more complete bibliography will soon be published.

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DISCUSSION

Dr. E. M. Stevenson: Dr. Narat's paper brings to my mind three questions of major importance: first of all, the need for such an apparatus; secondly, the application in the practice of medicine outside of teaching institutions and for didactic purposes; third, the cost and the maintenance.

In answer to the first question, may I say I feel there is a need for such an apparatus. This statement is borne out by the fact that as long ago as 1856 the

first attempt was made to perfect an electrical appliance whereby heart tones could be amplified, and at the present time, in the current literature, there are over 200 references to this particular subject.

The amplification of heart sounds in the realm of cardiac pathology permits of the detection of early cardiac disease which might otherwise be overlooked. Any apparatus which will permit the physician to institute proper therapy and to offer a prognosis to the patient and patient's family, where before he would have to wait for the audible evidences of heart disease to present themselves, is justified.

It is further made practical by facilitating auscultation under circumstances which may interfere with our ability to recognize or diagnose heart disease. Many times we see obese patients in whom we are not sure whether a murmur exists or not. Often the examining environment is such that we are not sure even of audible murmurs. The stethograph obviates this problem.

It seems to me that it is a solution for the man who is not trained in cardiology, and it certainly should be of definite benefit to the individual who has some impairment in hearing.

The application of the stethograph in the practice of medicine is valuable from the standpoint of diagnosis and prognosis. This apparatus which Dr. Narat has so ably described seems to me to obviate the observation of respirations, the recording of blood pressures and the auscultation of the heart during surgical manipulations of any kind, even in obstetrics.

It has a practical application in the office of the man doing general work by permitting of a permanent record, both for the information of the physician and the patient, and by virtue of its permanency, permitting comparisons to be made on findings from time to time.

It is of further value for men doing work for insurance companies, particularly when the question of insurability or disability in regard to the cardiac problem arises.

In addition, a surgeon is able to listen to the heart murmurs of his patient during the course of any major surgical procedure.

I am not privileged to make a statement in answer to the third question of cost and maintenance, but the essayist assures me the apparatus will be well within the reach of all who are interested. The machine itself is light. It is entirely portable. The simplicity of construction, the ease with which parts may be replaced, if and as necessary, and the elimination of camera and dark room, certainly speak well for a minimum in maintenance.

I certainly believe that a stethograph has a place in the practice of medicine as a supplemental aid, particularly in the field of cardiology.

I feel that Dr. Narat deserves considerable credit for having called our attention to a simple, less expensive, entirely practical form of apparatus which will enable all of us to further study our cardiac problems more efficiently.

I want to express my appreciation to the essayist and to the Chairman of the Section for the privilege of discussing this paper, for I feel that the essayist has provided us with a simplified and valuable adjunct in the diagnosis and prognosis and in the therapy of heart disease.

Dr. Narat: (Closing remarks) The apparatus described is not a substitute for the electrocardiograph. Both devices supplement each other. The stethograph is particularly valuable for the diagnosis of valvular lesions in which the electrocardiograph frequently does not furnish any information. The handling of the stethograph and the interpretation of the records are very simple. However, it is not the apparatus but the physician who makes the diagnosis.

VARIOUS ANESTHETIC AGENTS, ESPECIALLY SOME NEWER PREPARATIONS

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INHALATION ANESTHESIA

Inhalation anesthesia has been widely used and has been the method of last resort when other methods have failed. It is the method which usually comes to mind first when the word "anesthesia" is mentioned. The clinical use of many agents could be discussed but I prefer to limit my discussion to those that are of most clinical value. I shall not discuss chloroform, which is still used for obstetric analgesia in many places, nor shall I discuss ethyl chloride as a general anesthetic agent although it is used a great many times, especially for anesthesia of short duration. Anesthetists who administer ethyl chloride by the semi-open drop method find it useful in selected cases for certain purposes.

On the whole, ether, administered by the open drop or semi-open drop method, is still the anesthetic agent of greatest general usefulness in the hands of the average anesthetist. I believe its use is sufficiently well understood that I need not go into detail about it, except to say that I find, in the average case, that it is advantageous to administer atropine for drying of secretions and to give small amounts of a barbiturate the night before, and the morning of, operation. On the other hand, the use of morphine and barbiturates has resulted, in a very few instances, in such depression of respiration that relaxation could not be produced without inhibiting respiration. This, obviously, is undesirable. In

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institutional practice, although ether is still used in a large percentage of cases, the method of its administration has changed from the open drop or semi-open drop method to that of mixing it with a gas and oxygen by means of a gas machine.

Recently, divinyl ether, called "vinethene," has been introduced because with it anesthesia can be induced quickly and the period of recovery is short; consequently it was thought that it would be a better agent than diethyl ether. The only use for which I can as yet suggest that it might be an improvement over diethyl ether is for obstetric analgesia. My opinion is based on Bourne's[1] report of its value in obstetrics and not on personal experience. In the surgical cases in which I have used it, I have felt it was not as satisfactory in my hands as diethyl ether.

Of the gaseous anesthetic agents, nitrous oxide must be mentioned first because of its relative safety from the standpoints of inflammability and explosiveness, because of its lack of odor, and also because of the short periods of induction and of recovery when it is used. For the average patient who has received preliminary medication, and for whom ether in small quantities is not contraindicated, nitrous oxide and oxygen is a most satisfactory combination to which to add ether. The rate at which ether should be added is from ½ to 1½ fluidounces (15 to 45 c.c.) each hour, unless the carbon dioxide absorption technic is used. The present purity of nitrous oxide and the availability of modern devices by means of which it can be administered inexpensively, mean that it must be reconsidered as valuable in both large and small institutions. Although it is the weakest of the gaseous anesthetic agents in common use, preliminary medication in recent years has extended its usefulness, and in my opinion it has regained a great deal of the favor it lost when ethylene became widely used. It is particularly useful when tribromethyl alcohol in amylene hydrate (avertin) is administered preoperatively to produce basal anesthesia. For dental use it is undoubtedly the gaseous anesthetic agent of choice, especially for administration in the dental office.

Ethylene is a splendid contribution which Luckhardt and Carter[2] made to anesthesia. It has markedly influenced the search for still better agents and its use has pointed out to a host of persons, in the thirteen years since its introduction, that each patient should receive special consideration in the choice of the anesthetic agent that is to be administered to him. I believe that the importance of the wide use of ethylene is not realized at the present. The preparation will not be accorded its proper place until the history of anesthesia is viewed in retrospect about ten years from now. Ethylene, because it is inflammable and explosive, was limited in its clinical application more and more rapidly as cautery and diathermy became increasingly widely used. Its position has been less secure since cyclopropane has been introduced, although cyclopropane also is inflammable. Cylopropane is satisfactory for use in cases in which ethylene may not be safe, and, compared with ethylene, it gives better relaxation and more oxygen can be used with it. In my experience, these two agents have been very useful because when expense must be considered and the device for removing carbon dioxide is not at hand, ethylene is preferred to cyclopropane; on the other hand, if one of the most modern gas machines is available, cyclopropane, after experience has been gained in its use, soon is preferred to ethylene, especially in those cases in which a general anesthetic agent is to be given by inhalation and ether is contraindicated. The usefulness of either one of these gases is increased if a local anesthetic agent or ether is used as a supplementary agent. Cyclopropane has one characteristic effect when surgical anesthesia has been produced that gives it an advantage over ethylene; namely, that respiration is shallow. The surgeon wants a quiet patient, and to that end he may want extreme relaxation; however, such relaxation may require deeper anesthesia than is desirable in a given case. As has been pointed out before, shallow respiration often permits an operation to proceed with less relaxation than when breathing is natural or when it is increased in depth. However, ethylene is the more economical agent.

In my judgment, there is a definite place for each of the three gases that I have mentioned. Any one of them may be used with spinal or regional anesthesia, but it has seemed to me that cyclopropane gives the most uniformly satisfactory results when combined with spinal anes-

thesia or with abdominal block. Definite advantage is gained by infiltration of the line of incision or by use of a block method of anesthesia, whether ethylene or cyclopropane are to be used, because there seems to be more oozing when they are employed than when nitrous oxide is used. It has been interesting to me to have heard surgeons complain, when ethylene was introduced, that there was noticeably more oozing with it than with nitrous oxide, and then to have heard the criticism that cyclopropane produced more oozing than ethylene. In a few years everyone concerned will be accustomed to this phenomenon and then it may no longer be considered a disadvantage. Certainly wide choice in the gaseous anesthetic agents is offered and there seems little to be desired in that connection.

However, in addition to the development of valuable agents, there have been contributions which have increased the applicability of the inhalation method. For example, Magill's[3] large soft rubber intratracheal tube can be introduced either through the nose or the mouth and thereby furnishes the patent airway which is of inestimable value in administering any general anesthetic agent. The tube is sufficiently large that the patient can inhale and exhale through it, but any usefulness of the insufflation method is not lost if that method should become necessary for administering the anesthetic agent or for ventilating the lungs. During prolonged operations, a greased catheter can be inserted through the intratracheal tube and whatever material may have accumulated in the trachea or the tube can be aspirated. This is of obvious value in those conditions in which mucus or other material may be coming from the lungs. With the tube in place the mask can be fastened to the face in the usual way and satisfactory results can be obtained from general anesthesia when otherwise they would not be obtained. By means of an adapter, the tube can be connected to the gas machine so that the anesthetist and his devices will be eliminated from the field of operation. This has greatly facilitated plastic surgery and other operations on the face, head, and neck. The method is obviously indispensable for operation in many intrathoracic conditions and is of special benefit in operations for diaphragmatic hernia. I know of no single thing in general anesthesia, unless it be ether itself, the loss of which I would feel more keenly than if I now had to give up this method of Magill's. I feel that physicians as a whole should know something about the use of the large intratracheal tube.

RECTAL ANESTHESIA

Anesthetic agents have been administered by rectum for a number of years. The first significant step in establishment of this method was the use of a mixture of ether and oil by Gwathmey in 1913.[4] Successful application of this method requires preliminary medication which depresses respiration. Preliminary medication is easily accomplished by the combined use of morphine, atropine and a barbiturate. It is essential that escape of ether in the breath be minimized or controlled so that the ether will accumulate in the blood stream in such concentration that the patient will be anesthetized. The importance of rectal anesthesia was relatively greater up to about 1923 than since, because alternative methods of anesthesia had not been sufficiently developed. The uncontrollability of a single large dose of an anesthetic agent given by rectum retarded development of the method and in time it was utilized mostly for obstetric analgesia. In this field it was useful and beneficial, and it continues to be so. The oil-ether colonic method has been applied to control of patients suffering from severe, uncontrolled asthma.[5] For children the mixture generally has been 50% ether and 50% oil. For adults, 65% ether and 35% oil are employed and of the mixture, 2 fluidounces (60 c.c.) are given for each 20 pounds (9 kg.) of body weight, when anesthesia is to be attempted, and a gas is given by inhalation in the amount necessary, as a supplementary measure.

For the surgeon who is operating on the head or the upper part of the body, obviously it was convenient to have the anesthetist out of the way. For this reason, chemists attempted to produce a better anesthetic agent for rectal use. The result was introduction of tribromethyl alcohol in amylene hydrate (avertin), which is not eliminated through the lungs but instead is detoxified in the liver. In the first period of its use as an anesthetic agent, untoward results occurred because of a weakness that cannot well be overcome in the rectal method of anesthesia; namely, that the average dose given to some individuals may be a toxic dose for others. In time, how-

ever, the method was altered so that the drug was used in relatively safe doses and for basic anesthesia, which, by itself, is insufficient for operation. Supplementary anesthesia, either local or general, however, is used and the combined effect is satisfactory. This combined method of anesthesia has filled a real need, especially in those institutions in which the anesthetist is not equipped to make available to the surgeon all of the modern methods of anesthesia. Preliminary medication is not always used when avertin is employed, although I prefer to give a small dose of a barbiturate, and thus reduce the dose of avertin. There have been occasional cases in which avertin has seemed to be the preparation of choice, as for example in fulguration of pharyngeal tumors or in major manipulations with the bronchoscope and especially in connection with use of the fluoroscope. These agents for rectal anesthesia, of course are to be avoided in the presence of diseases, or lesions of the rectum or colon.

Rectal use of the barbiturates has been attempted. I find that they are particularly useful in anesthetization of very small children; a capsule of the sodium salt of a barbiturate can be given as a suppository with excellent results when transfusion of blood or intravenous administration of fluids is necessary. Because of the freedom from untoward reaction in cases in which barbiturates have been administered it probably is advisable to give them as premedication, by the rectal route, to adults who are to receive fluids intravenously. The care with which the solution of avertin must be prepared does not add to the convenience of the rectal method, and in all probability, the development of this method to a wide clinical application will depend on the availability of better agents than at present can be had.

INTRAVENOUS ANESTHESIA

Interest in the intravenous method of anesthesia has gained its greatest impetus since introduction of the short-acting barbiturate, sodium n-methyl-cyclohexenyl methyl malonyl urea (evipal soluble). It is unfortunate that in its early use the technic recommended was to inject an indefinite quantity of the drug intravenously, remove the needle, and then proceed wth the operation. It will be widely recognized, if it is not already, that a safer technic is to administer the barbiturate intermittently as it is needed, following the general principle applied when ether is administered by the open drop method. Recently a new thiobarbiturate has been developed which seems to me to be a useful agent and one that gives promise of making more widely acceptable the intravenous method of anesthesia.[6] This drug has been called "pentothal sodium."

A person who is experienced in the intravenous use of these agents becomes rather enthusiastic about them when they are applied properly. They should not be used for long operations which require great muscular relaxation nor should they be used for manipulations in the throat, as for example bronchoscopy, which cannot be satisfactorily performed unless the throat is cocainized. The combination of intravenous anesthesia and cocainization of the throat is a happy one, especially when the procedure has to be repeated. The intravenous method should be avoided in most cases if a disease or condition is present which obstructs respiration or may produce symptoms, one of which is dyspnea. It is advantageous to use a preliminary dose of morphine, a barbiturate, and atropine when the procedure is going to take some time, for instance, thirty minutes. However, for short procedures, such as manipulation of a joint, reduction of a Colles' fracture, removal of one or two teeth, opening of an abscess, or spinal puncture, no preliminary medication need be given. It has been used for a variety of operations (Table 1).

The principal sign of anesthesia when these new barbiturates are given intravenously is essentially related to the depth of respiration. If anesthesia is profound, respiration is shallow, and vice versa. In order to make conditions as safe as possible for the patient, I have hit on the scheme of using a cotton "butterfly" fastened to the upper lip in such a way that inspiration and expiration of air are indicated by motion of the cotton.[7] If respiration is not arrested at any time, the patient is considered to be in relatively safe condition. In order to add further to the relative safety of the method, I have incorporated in the anesthetic solution a certain amount of respiratory stimulant. Although this modification of technic is relatively recent, and for that reason only one of the many respiratory stimulants has yet been tried, the results are, to me, encouraging. The present combination is 1

gm. of pentothal sodium dissolved in 20 c.c. of sterile distilled water to which is added 1 c.c. of a 25% solution of coramine so that the proportions are one part of coramine to four parts of pentothal sodium. The patient's respirations are more visible in the average case when the respiratory stimulant has been used than when it has not been used. The use of a respiratory stimulant is particularly valuable when preliminary medication has been used. Further refinement of this technic will bear probably on selection of the best anesthetic agent and the best respiratory stimulant that can be obtained; the judgment of the anesthetist will be important as to whether he will use or omit the stimulant for a given patient, and if it is to be used, in what proportion. Such judgment can come only from experience in the use of this technic.

The use of a 5% solution of pentothal sodium instead of a 10% solution has practically eliminated the occasional complaint of sore arm on the part of the patient. This complaint is attributable either to extravascular injection or to hemolysis and thrombosis of a vein; in some cases it is reported that a nerve near the vein has been injured by the needle. When an extravascular injection of the solution has occurred however, and there is an untoward reaction, application of moist heat has been beneficial.

Patients to whom these intravenous anesthetics have been given often have tolerated them better than other anesthetics because there seems to be less nausea and vomiting than even with a gas. The skin remains dry and warm and it has seemed to me that there was less shock in many instances than I might have expected. I refer particularly to cases in which shock has followed previous anesthetization and a surgical procedure and the surgical procedure must be repeated at a short interval. I do not maintain that there is no shock, but that it appears more slowly and for that reason can be more easily combated. I do not recommend that this method be used by inexperienced individuals. I feel that at least they should witness the administration of an intravenous agent a few times before they attempt it. Whenever it is used there should be a justifiable reason for using it.

REGIONAL ANESTHESIA

Local and regional anesthesia have found such useful application that I feel it unnecessary to urge their use, except to say that I think they are not used enough in combination with anesthesia by inhalation and with proper preliminary medication. This impels me to urge again the use of a mixed form of anesthesia which I have called "balanced anesthesia." In this procedure safe doses of preliminary medicaments are used, moderate amounts of a local anesthetic agent are then injected, either locally, regionally, or intraspinally, or if the scope of the operation and the duration of it make control by the local agent or method impossible gas anesthesia is used in a supplementary fashion. For example, the combination of cyclopropane with spinal anesthesia has been very satisfactory. At present a great deal of interest centers on spinal anesthesia. It is a splendid method of producing relaxation and when that is essential to the success of the operation, use of spinal anesthesia must be seriously considered.

The most important single point to be remembered in the use of spinal anesthesia is that serious untoward effects can be warded off only if the method is avoided in cases in which marked debilitation is present, regardless of whether the debility is evidenced by one or by several signs and symptoms. For example, spinal anesthesia is practically contraindicated for those patients the concentration of whose hemoglobin is less than 50% of normal, for those who have recently lost an extreme amount of weight, for those who have undergone a prolonged period of intestinal obstruction with dehydration, for those whose blood pressure is less than 100 mm. of mercury, or for those on whom operation may be complicated by marked, and perhaps uncontrollable hemorrhage. It may be avoided in highly neurotic individuals or those with central nervous system pathology. The indications for spinal anesthesia depend somewhat on the agents and methods of anesthesia that are available to the surgeon at the time of the operation under consideration, because successful use of this method depends on skill in administration, good judgment as to its suitability, the extent and duration of the operation, whether or not means are at hand for combating immediate untoward results, and the availability of an anesthetist to administer an anesthetic by inhalation, together with oxygen, as a supplementary procedure, and

especially if circumstances are favorable for its application.

Ordinarily it is best to use procaine for spinal anesthesia and to make the subdural injection through one of the lumbar interspaces. Preliminary administration of a barbiturate, morphine and atropine is desirable. The concentration of the solution as it leaves the syringe should seldom exceed 5%; ordinarily it is about 3%. The lumbar puncture now can be performed with the patient lying on his side unless difficulty is anticipated, and then it should be done with the patient in a sitting position. Barbotage is not used. I keep the needle in place for about ten or fifteen seconds after the injection has been made, with the patient's head no longer flexed. Use of ephedrine to support the blood pressure is usually advantageous. The dose of ephedrine should also be estimated for the individual patient as is the dose of procaine. For example, it is usual to administer, for the ordinary operation on the average adult, 1 mg. of procaine for each pound (0.5 kg.) of body weight, this to be reduced in proportion to the patient's debility. I usually administer 25 mg. of ephedrine just before administration of the anesthetic agent, with the idea of permitting the systolic blood pressure to fall from, say, 120 to 80 mm. of mercury. If the fall is greater, say, to 60 mm. of mercury, an additional amount of ephedrine, usually 25 mg., is injected intravenously. When a patient has hypotension before operation, 50 mg. of ephedrine is given before the spinal anesthetic agent is administered. It is my intention always to give a safe dose of the spinal anesthetic agent, regardless of whether or not adequate anesthesia results, as I would much prefer to supplement spinal with general anesthesia, because the spinal anesthesia is inadequate, rather than to have satisfactory spinal anesthesia and find it necessary to treat the patient for too marked prostration. Nausea and vomiting, which not infrequently occur in the course of spinal anesthesia, especially in intra-abdominal operations, usually can be controlled by administration of oxygen, or of oxygen and carbon dioxide, or of an anesthetic gas.

Lumbar puncture headache occurs in a certain number of cases. The treatments for it are many. Usually, if the patient's head is kept down, as when he lies flat in bed, or if he is kept in slight Trendelenburg position, he is afforded relief. The administration of analgesics, such as acetylsalicylic acid, amidopyrine, or other hypnotic agents such as amytal and pentobarbital sodium, give some relief. The use of a retention enema of 50% solution of magnesium sulphate has helped some patients, and the use of pituitrin has helped others. Additional spinal punctures and intravenous injections of concentrated solution of glucose have given results. Even suggestion has been used in cases in which the headache seemed already to be subsiding; in any event, the patient appreciates encouragement. If patients complain for months or longer, there is usually some factor, not yet well recognized, that is contributing to persistence of the symptoms; they recur whenever the patient becomes tired or worried or during periods when sleep and rest are inadequate.

Spinal anesthesia seems to depend for part of its favor on the ease with which most physicians perform lumbar puncture. However, when someone is available who is trained, other methods of regional anesthesia may often be used with satisfaction and with few undesirable effects. For example, abdominal block or infiltration of the line of incision will provide anesthesia for incisions, and supplementary administration of an anesthetic agent by inhalation will provide anesthesia for intra-abdominal manipulations. The combination will be effective during the period of closure of the wound. It is much easier to utilize this balanced method of preliminary medication and regional anesthesia when one has relieved the patient of fear, but it is especially useful for those patients who do not wish to undergo general anesthesia by inhalation. Sacral block, when it is available, is a satisfactory method of anesthetizing for operations on the anus, rectum, and perineum. It produces anesthesia with relaxation and, when preliminary medication has been used and the amounts of 1% solution of procaine employed are less than 100 c.c., respiration is usually quiet and nausea and vomiting seldom occur. Sacral block anesthesia, in the hands of interested and experienced users, is satisfactory, and I think more attention should be given to it by the anesthetist, the surgeon, the obstetrician, and especially by the proctologist, for its value in operations on the anus, I believe, is definite. I think it is of sufficient importance

that physicians should be trained to administer this type of anesthesia for those who do not have the time to make a study of it. Cervical block, paravertebral block, field block, and various other uses of local anesthetic agents deserve the attention of all who might find a use for them. At the same time, one should be cautious in the use of those agents which have not been proved by long use to be relatively safe. Occasionally injections of local anesthetics are of aid in the location of pain paths and may help to arrive at differential diagnosis. Injections for the relief of pain in inoperable conditions have been advocated and in selected cases they are worth trying, provided the patient understands beforehand that he may not obtain relief and that the condition may be worse.

SELECTION OF THE METHOD

Careful selection of an anesthetic and method of administration that seems indicated in a particular case are important. I think one should have a definite reason for using a given agent or method in a given instance. Efforts should be made toward making available the various anesthetic agents and the methods of their administration that have been found to be useful and relatively safe so that patients generally may have this additional benefit besides those already available through modern surgery.

Table 1

ONE THOUSAND SIX HUNDRED FORTY-FOUR CASES IN WHICH PENTOTHAL SODIUM* WAS USED INTRAVENOUSLY
(June 18, 1934 to March 1, 1936)†

	Cases
Operation on brain and other parts of central nervous system	53
Operation on eye	83
Dental extraction	40
Cystoscopic examination	277
Transurethral prostatic resection	58
Fulguration (bladder, urethra, and so forth)	72
Manipulation ureteral stone	29
Miscellaneous urologic procedures	105
Operation within thorax	27
Operation on breast	104
Operation on thoracic wall	23
Operation on head and neck; oral and plastic surgery	263
Dilatation and curettage	144
Miscellaneous extra-abdominal operations	189
Miscellaneous intra-abdominal operations	42
Spinal puncture	25
Removal of packs, drains, and so forth	62
Dressing, insertion of radium, examination, and so forth	48
Total	1644

*Sodium ethyl 1-methyl butyl thiobarbituric acid.

†In about 10% of cases pentothal sodium was used for induction of anesthesia and was followed by inhalation anesthesia.

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OUR LAY ANESTHETIST PROBLEM

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The Bulletin of the American College of Surgeons in October, 1935, makes the following statement in its Hospital Standardization Report:

"The science of anesthesia is rapidly developing. New types of anesthesia, new methods of administration, and complicated apparatus demand serious medical thought. It is unfortunate that a large number of hospitals fail to recognize the necessity and value of a well organized department of anesthesia. This presupposes competent medical supervision, preferably a medical anesthetist, but when such a specialist is not available, a member of the medical staff qualified in administration of anesthesia may be appointed. Such a requirement does not preclude the use of the nurse anesthetist who is properly trained and qualified to give anesthesia. It is unfair to expect the nurse to be responsible for the service, but rather she should work under proper medical supervision. As the administration of anesthesia is generally conceded to be the practice of medicine, and inasmuch as it involves risk to human life, it is only reasonable to expect medical supervision. This cannot be done properly by the surgeon for he is frequently not specially trained in this work, nor should he have to carry the responsibility when under the strain of operating."

This report clearly states that a nurse administering an anesthetic is practicing medicine. This she has no legal right to do. What are the licensed physicians going to do to overcome this admitted violation of the Medical Practice Act? Are they going to allow themselves to be divested of their property rights by allowing technicians to practice medicine? Our County Medical Society in Article I of its constitution states:

"The objects and purposes of the Society shall be to

Address before Erie County, N. Y., Medical Society.

extend medical knowledge and advance medical science; to elevate the standard of medical education; to secure the enforcement of just medical laws; to promote friendly intercourse among physicians; to guard and foster the material interests of its members, and to protect them against imposition; to assist in the preservation of the public health; and to enlighten and direct public opinion in regard to the problems of medicine."

Thus we have a constitutional right in our Society to request action and protection in this infringement on our property rights. Many graduates in medicine are willing and anxious to qualify themselves in the specialty of anesthesia, but have become discouraged when confronted with the fact that many hospitals and surgeons will not give up the administration of anesthesia by nurses. Naturally, we ask for the reasons for this attitude. I will briefly go over some of them.

I. *The Surgeon's reasons:* (a) The cost of anesthesia is less. He can hire a nurse anesthetist for $100.00 a month, or less, and besides administering anesthetics, she also will do office and laboratory work. I have had one such nurse tell me that she averaged less than $5 a case, the surgeon charging $10 and up for her services.

This is probably good business, but to my mind is far worse than fee-splitting which the Bulletin of the American College of Surgeons condemns five times on one page.

(b) The nurse anesthetist is always on hand. The surgeon does not have to wait for her.

(c) She has a certain mechanical skill which is better than using an interne or untrained medical anesthetist.

(d) She has no ambition to get beyond anesthesia and has no interest in the operation, nor in using anesthesia as a stepping stone to surgery.

The Hospital's reasons: (a) Many hospitals feel that they have a right to a profit from anesthesia. One hospital I know of has gone so far as to raise the surgery charge to include the anesthetic fee. Thus when a physician anesthetist is called in, the patient has to pay both the hospital fee for anesthesia and the fee of the medical anesthetist. Other hospitals demand and receive a commission on all anesthetic fees collected by medical anesthetists.

(b) Better control is had over anesthetists. Nurse anesthetists can be hired and assigned certain hours on duty as with other hospital personnel.

(c) Certain hospital associations have started a propaganda for nurse anesthesia and have even gone so far as to subsidize an association of so-called hospital anesthetists. Hospital authorities feel they must support these hospital associations in every way.

I do not think that any of the above reasons are valid to continue the practice of nurse anesthesia. Certain hospital staffs, headed by conscientious surgeons, have felt that the patient should have the best possible service and demand that anesthesia be placed in the hands of trained medical anesthetists. Dr. S. S. Goldwater, New York City's Hospital Commissioner, in his annual report for 1935 states in regard to anesthesia:

"Analysis of the anesthesia service at Bellevue Hospital showed that the old staff, consisting of a medical anesthetist, assisted by nurses was incapable of developing and supporting an adequate program, incapable of utilizing the latest advances in anesthetic technique or of contributing to the teaching of the science and art of anesthesia. A new service was arranged with an exclusively medical personnel. It is now possible for the anesthetists routinely, to make pre-operation evaluation of the patient's tolerance to a proposed operative procedure and to take part in resuscitation procedures."

Let us now look into the advantages of a trained medical anesthetist.

1. He usually owns his equipment. The value of an up to date anesthesia equipment including oxygen and carbondioxide therapy apparatus, and portable apparatus to be used in homes, is at least $2,000.00. With proper support from the medical profession he can keep his machines up to date and add new material as it is brought out.

This is important, as machines that were up to date five years ago are now practically obsolete and have had to be replaced. This is not being done by the nurse anesthetists. They are trained in one method, usually not up to the minute, and forever afterward adhere to that method. In some hospitals I have seen nurse anesthetists using methods that were used twenty years ago and are now considered unsafe by leading anesthetists.

2. Through frequent Congresses of anesthetists, other medical meetings and journals of anesthesia, the medical anesthetist can keep up

to date. He is always welcome at the large teaching centers of anesthesia.

3. Due to his medical training he is able to act as consultant as to which anesthetic agent to use and to evaluate the risk of the operative procedure in each patient. This decreases postoperative morbidity and mortality to a marked degree. Dr. Frank Bortone of Jersey City, N. J., found in a survey of New Jersey hospitals that technician anesthesia was at least one-third more fatal than professional anesthesia. Medical anesthetists have been able in some instances to reduce what had seemed like an irreducible surgical mortality in their institutions. I will quote briefly a few instances:

Dr. André Crotti of Columbus, Ohio reported a death rate of 0.9% in a series of 7000 goiter cases.

Dr. Frank Leahy of Boston, 12,000 goiter cases with a death rate of 0.85%.

Dr. Chas. E. Chambers of Doncaster, England, in a four year period was able to reduce his mortality from 4 to 1% by substituting expert anesthesia instead of inexpert anesthesia.

4. The medical anesthetist can take on the duty of teaching internes and medical students in the hospitals and medical schools. This is sadly neglected. It seems paradoxical that in Buffalo some of the surgeons connected with the University of Buffalo are using nurse anesthetists. Leaving aside the consideration of the patient for a moment, is it not the duty of such professors at the University of Buffalo School of Medicine to further the science of anesthesia by supporting medical anesthetists so that students of medicine and internes can be properly taught anesthesia? The practical teaching of this art is woefully neglected at the university and in the hospitals connected therewith. Are the Professors of the University of Buffalo willing to admit that they have no desire or capability of teaching students and graduates in medicine to administer an anesthetic properly? If so they are dishonoring their obligation as teachers and admitting defeat by not being able to provide knowledge to, and utilization of members of their own profession in so noble and essential a branch of medical practice as anesthesia.

5. Newer anesthetic agents can be properly evaluated. In the past few years the medical anesthetists have brought out and perfected the use of several new agents; notably the barbiturates, by the medical anesthetic staffs of Indianapolis hospitals; the use of cyclopropane by Dr. Ralph Waters and associates of Madison, Wisconsin; the carbon-dioxide absorption technique by the same men. There has been no one advance of any importance made by the technician anesthetists.

6. During the operation the medical anesthetist charts the blood pressure, pulse and respiration. He can detect symptoms of impending shock by these methods sometimes twenty minutes before it really occurs and can advise the surgeon of danger. Also he can advise the curtailing of the operation or of the completion of it in two stages. Postoperatively he can watch the patient, keep the air passages free from mucus, vomitus, etc., and prevent or treat atelectasis. The technician anesthetist is not qualified, trained or legally allowed to attempt these functions.

7. Savings in the amount of anesthetic gases and other materials have been great. At the Millard Fillmore Hospital in Buffalo, N. Y., the charge for gas has been reduced from six dollars per hour to two dollars a case when the newer apparatus is used. Thus in an operation lasting one and one-half hours, there is a saving on gas alone of several dollars or practically half of the usual anesthetists fee. Also the stay in the hospital can be reduced. All concerned are more liable to be paid if the hospital bill is lessened by decreased gas costs and days in the hospital. Drs. Russell, Connell and Anderson of Des Moines, Iowa, reported to their County Society a saving of one and one-half days for their patients from the time they left the operating table until they took their first nourishment, adding that this saving of hospital days was anywhere from four to ten days.

Thus we see that the nurse anesthetist is a legal, moral and economic liability to the hospital and medical school. She does not provide the same degree of safety to the patient that professional anesthetists do; she is incapable of conducting a complete modern anesthesia service for the convenience of the medical profession; she can not aid in the teaching of internes not having the fundamental education for such a function; she is not an economic asset for the patient although she may seemingly be for the hospital or surgeon.

The question now naturally arises: "How much loss is there to the Medical Profession?" Figuring conservatively, there is a yearly loss to the profession of between $75,000 and $100,000, in the City of Buffalo alone. McMechan rightly says:

"The economic factor responsible for 25,000 too many doctors is the fact that 25,000 technicians are practicing socialized and corporation medicine. This is forcing more and more doctors to go into the surgical specialties to make a living. Further overcrowding and technical invasion will inevitably destroy surgery economically. So far the legal profession has protected its property right by avoiding the pitfall of supervised practice of law. But it has had to secure Supreme Court decisions to protect itself from lawyers delegating this property right to banks and other instituions for the corporation practice of law. If the property right to practice medicine is not upheld as interpreted by West Virginia, and Indiana, and safeguarded by the profession, the socialization and corporation practice of Radiology, Pathology and Anesthesia will be the future fate staring all other specialists, including surgeons, in the face"

It may be of interest to the profession to know that just recently a few surgeons and the hospital authorities in Atlanta, Georgia, tried to revise the constitution of the Atlanta Academy of Medicine to provide that Radiology, Pathology and Anesthesia were not the practice of medicine and even the Dean of Emery University Medical School sided with these destructionists. If it were not for the activity of Dr. Collier and others interested in the welfare of the profession, this proposed robbing the licensed medical graduate of his property rights might have been accomplished.

I have been informed by legislators that the medical profession can obtain any legislation they want if they are only united in their efforts, but that it is very difficult to have the profession act as a unit for their own benefit. Therefore, legislation to help the profession is not put through, and even harmful legislation is passed.

There also has been a lack of interest in the State Medical Society and the American Medical Association in providing a section on anesthesia. Such a provision would place medical anesthesia in a more dignified position and help in its advancement and acceptance by surgeons and hospitals. To enlighten the profession as to what has been accomplished in Indiana, I will quote from a paper entitled "Indiana State Medical Association Section on Anesthesia, Its Background and History," by Floyd I. Romberger, M. D., Lafayette, Ind.

"An March 30, 1934, our State Board of Medical Registration and Examination went into Executive Session and, after due consideration and mature deliberation, issued the epochal edict that the administration of an anesthetic was indeed and fact medical practice. They notified all the hospitals of the State of Indiana of this decision, citing two counts, one against the hospital, the other against the nurse.

1. Concerning the hospital: "The hospital is violating the Medical Practice Act, as a corporation can not have the privilege of practicing medicine under the law." It was becoming increasingly obvious to the Board that, in the event that it is permissible for hospitals to use nurses to practice medicine in the form of anesthesia, then, indeed, it would be no departure from principle for hospitals to employ surgeons, obstetricians, or what not. And to collect and chisel in on the fees! Syndicated practice! Further, a corporation cannot be licensed to practice medicine because a license is an individual right; nor can a licensee lend his license to a corporation or to a lay person, such as a nurse.

2. The Board's interpretation relative to the nurse anesthetist was: "The nurse is practicing medicine without a license, as she is assuming duties which are, under the law, those of a licensed physician." This was and is the Board's interpretation of the Indiana Medical Practice Act. These Medical Practice Acts are not for the vain and glorified purpose of creating a medical monopoly within each state, nor are they primarily designed to regulate the intimate details of medical practice. No! The acts were passed as necessary measures for the protection of the public weal, so that unqualified and unscrupulous practitioners may not foist themselves upon the unsuspecting citizenry of their respective states. The Indiana Board was not peculiarly and particularly and alone interested in the sole objective of anesthesia as being medical practice, rather they took a far broader attitude; they felt keenly that to them had been delegated the authority and upon them rested the responsibility of strictly enforcing the Indiana Medical Practice Act in every phase, whatsoever the method of practice, so that all and everyone who would attempt to heal, cure or relieve medical sickness or surgical illness, by any means whatsoever, first should qualify for such practice under the law as laid down by the sovereign state of Indiana. In other words, the public weal was and is and ever remains the fundamental consideration. On August 2, 1934, in a letter to the Board, Attorney General Lutz rendered the following opinion:

"It is the general knowledge that an anesthetist in rendering a person insensible to pain must, in the administering of this agent, continuously diagnose and keep a careful watch and supervision over the amount of the agent that is to be administered. It is impossible for the surgeon to perform his operation and also to assist in any way in the administration of an anesthetic.

"The law is—to prescribe for or to give surgical as-

sistance to, to heal, cure or relieve—shall be engaged in the practice of medicine within the meaning of this act.

"It follows from the above that, in our opinion, the administering of an anesthetic is a duty to be performed by a licensed physician only. Philip Lutz, Jr., Attorney General.

"In some states and many communities, lay anesthesia is permitted or condoned behind the thinly camouflaged words, 'under the supervision of and in the presence of a licensed physician.' This is of itself, neither more nor less than implied guilt on the part of such physician that he is criminally lending his license in the perpetration of a fraud. Against his own state law! Against his own State Board! Against his own profession! Because by no concept of the imagination can it be otherwise than that an act which requires professional supervision is of itself, a professional act. Accordingly, doctors never should have tolerated this flagrant infringement upon our property rights for these many years without vigorous protest. State Association sections on Anesthesia will go a long way toward re-establishing our just and lawful position before every court in the land. Upon your individual efforts in organized medicine, as well as upon your active, cooperative participation in the integral whole, depends the practice of medicine in the future years."

It may be here noted that Indiana has a well organized section on anesthesia in its State Society.

Let us now consider how to overcome this evil. Are there any means to stop it? Can sufficient pressure be brought to bear on surgeons and hospitals so that not only will our generation be protected, but that medical students of the future be assured that they will not be deprived of their right to make a living? Anesthesia is still in the pioneer stage of its development, but will undoubtedly become a specialty of the highest importance. All the fundamentals of anesthesia can be taught in our medical schools. Animals are continually being put to sleep for operations in our basic science laboratories, by which students of medicine can be taught. This is done at such universities as Wisconsin, Stanford, Cincinnati, Chicago, Illinois, and many others. If the same amount of money were paid out to specialists in anesthesia as is paid out to technicians, a great improvement could be made in this art. The code of medical ethics of the British Empire removes any physician from the medical register who uses any one but a doctor to give an anesthetic or who gives an anesthetic for any one but a registered doctor. As a result every hospital has its full quota of exceedingly competent medical anesthetists.

It seems to me that the following suggestions will be helpful in effecting the much needed changes.

1. A general practicioner referring a case to a surgeon should request, or if necessary, demand that a qualified medical anesthetist be employed if an anesthetic is to be given. Failure to comply with such a request would prove that such surgeon has not the interest of the profession at heart, but is working for his own selfish interests. This evil would be curbed if surgeons realized they might lose some of their referred cases.

2. When referring a case to a hospital this precaution should also be taken. Hospitals would soon see the error of their ways and not coerce members of their staffs to use nurse or technician anesthesia against their better judgment. I know of several surgeons who would like to use competent medical anesthesia, but do not do so on account of the policy of the hospital. They do not care to endanger their hospital staff connections.

3. A resolution could be adopted by the County Society condemning the practice of technician anesthesia, a copy of such resolution being sent to each hospital in the County and to each member of our Society.

4. The delegates to our State Society could be instructed to vote in a body to secure legislation such as has been done in Indiana and West Virginia. However, this can not be enacted at once as there are not at present enough medical anesthetists to cover the work. Sufficient time, which would require two or three years, should be given hospitals and surgeons to make the change. If cooperation is had from both surgeons and hospitals, the patient, and the medical profession as a whole will be greatly benefited thereby. This does not mean that surgeons and hospitals should use this argument as a subterfuge for not fostering the proper training of anesthetists and the placing of anesthesia under proper medical supervision as has been recommended by the American College of Surgeons and progressive Universities of Medicine.

5. The Committee appointed by the Erie County Medical Society composed in part of anesthetists should interview each surgeon and

hospital using nurse anesthetist. A complete report should be made to the Society of the willingness of hospitals and surgeons to comply with the recommendations of the American College of Surgeons and of our County Society, so that improvements can be instituted for the benefit of patients, hospitals, the general profession as a whole and the training of students of medicine.

6. There should be a section on anesthesia in the State Society and in the American Medical Association. The establishment of such a section should have our full support.

Anesthesia is still in its early development. When one considers that it has been only ninety years since its discovery, and that some of us have practiced in this specialty over thirty years, we only then realize that much is yet to be perfected and discovered in the science and art of anesthesia and that the opportunity for good work in this field is great. Let us not allow this specialty to be taken from our hands and be placed in the hands of mere technicians by selfish hospitals and surgeons, and also by lackadaisical members of the profession. Only concerted action by all having the welfare of the profession at heart can prevent this important branch of the practice of medicine from falling into the hands of improperly trained individuals and becoming socialized or corporation practice. The security of the average physician is no greater than the strength of the organized County or State Medical Society. The interest of the doctor cannot begin and end only with his personal affairs; he is a part of organized medicine and can only exist as such due to labors on the part of organized medicine in the past. Let us not by our present negligence and lack of interest destroy the very existence and advancement of a very important branch of Medical Science.

468 Delaware Ave.

ONLY WAITING

Small Boy: "Grandmother, when are you going to start playing football?"

Grandmother: "Why, sonny, I can't play football. Why?"

Small Boy: "Well, papa says he is going to buy a new car as soon as you kick off."—*Carolina Buccaneer.*

THE PRESENT CONCEPT OF ENTAMEBA HISTOLYTICA INFESTATION

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Reviewing my personal experience with the diagnosis and treatment of *Entameba histolytica* infestation beginning with November 23, 1931, and bringing it down to date, June 15, 1936, I find that I have examined fifty-three cases in which this organism was diagnosed by the laboratory. Not one of these cases presented the typical clinical symptoms of amebic dysentery; very few of them presented the characteristics of massive infestation; and the larger percentage had but a small number of the parasites in the single or first stool examination.

The clinical manifestations are grouped as follows:

1. Chronic ulcerative colitis of twenty years standing; amebiasis diagnosed fifteen years ago; blood in the stool.

2. Chronic ulcer at the splenic flexure with contracture; blood in the stool.

3. Perforation of the head of the cecum; intestinal hemorrhage.

4. Spastic colitis—mucous colitis; amebae found in the bronchial secretions.

5. Gastric and intestinal hemorrhage; amebae abundant.

6. Spastic colitis and chronic constipation.

7. Spastic colitis before hysterectomy; adhesions following; colon dilatation.

8. Spastic colitis and involvement of the organ of equilibrium.

9. Spastic colitis from childhood when infection is assumed to have occurred.

10. Mucous colitis associated with spastic contractures.

11. Spastic and mucous colitis.

12. Spastic constipation; some mucus.

13. Spastic constipation associated with intercurrent attacks of mucous colitis.

The following summary of the periods under treatment and the results attained will be of interest.

Total number of cases examined	53
Longest period under observation ..... March, 1932, to April, 1936	
Number of cases diagnosed only	3
Number of cases treated one month	4
Number of cases treated two months	4
Number of cases treated three months	6

Number of cases treated four months 5
Number of cases treated six months 31
Number of cases in which supplemental or final examinations were never made..... 28
Number of cases "cured" 15
Number of cases in which there were no clinical symptoms 27
Number of cases in which symptoms were relieved 23
Number of cases in which symptoms disappeared . 15
Number of cases with ulcerations, adhesions or other structural alterations in intestine..... 13

The treatments employed included Chiniofon, Carbarsone, calomel, bismuth subnitrate, Colonidin, malic acid, C. P. (active—Pfanstiehl), Diodoquin, castor oil, naphthalene, and other remedies reputed to have more or less virtue in removing or destroying amebae.

In all cases submitting to treatment, sufficient clinical improvement was secured to satisfy the patient that he was materially better or "well."

I hesitate to introduce any additional factors of uncertainty regarding a condition which is still so little understood by the great mass of practitioners, but we must consider the "silent" infestation with the *Entameba histolytica.*

The text-book description deals chiefly with the active morbidity, pathology and mortality produced by, or associated with, the virulent or heavy infestation with this organism. The clinical definition and general description reads somewhat as follows:

"Amebic dysentery is a specific infection of the large intestine caused by the Entameba histolytica, characterized by a variable mode of onset and course of great irregularity, marked by diarrhea and intestinal symptoms which are usually intermittent with frequent involvement of the liver.

"The diagnosis depends upon a history of residence in an endemic locality. The disease is prevalent in tropical and sub-tropical regions, although sporadic epidemics in temperate climates are not infrequent, particularly in warm weather.

"Exposure to a known focus of infection by ingestion of food (particularly uncooked), and water is important.

"Contributory factors include unsanitary methods of sewage disposal and food preparation, and the prevalence of flies which may carry dejecta.

"Symptoms are preceded by an incubation period which is uncertain, but probably numbers fifteen to ninety days.

"The onset may be sudden or very insidious.

"The symptoms may be divided into:

1. Mild or latent forms;
2. Forms with acute onset;
3. Advanced or chronic forms."

Considerable space is generally given to the discussion of liver and lung abscesses and their diagnosis; brain abscess; peritonitis; the differential diagnosis from bacillary dysentery and the different forms of pathoses in the large intestine. The use of emetine hydrochloride, Anayodin, colonic irrigation and surgical intervention in treatment. The whole picture is a lurid one and quite characteristic of tropical or semi-tropical infestations.

With this symptom complex in mind, it is difficult to address our attention, with sufficient detail, to the mild or latent forms which, in my opinion, are so common that any form of persistent or recurrent intestinal discomfort should be thoroughly studied by a competent protozoologist, who will subject the patient to an examination of all stools (up to six or seven if there be so many) immediately following a brisk purgation, and the use of warm-stool, warm-stage technic.

In the mild or latent forms the following is a generally accepted description:

"The onset is very insidious, characterized by some lassitude, abdominal discomfort and dyspepsia. Moderate diarrhea or constipation may appear.

"The course is chronic and may be prolonged over weeks and months. There are occasional outbreaks of diarrhea and occasionally a stool containing mucus and occasionally red blood.

"With further progression the symptoms increase in severity and may be classed as cases with acute onset, advanced, or chronic ones."

The fact that with regression, the symptoms suggestive of amebiasis are entirely replaced by symptoms of other types of intestinal disturbance, is neglected.

In June, 1933, I felt justified in making the following statements:

1. That these parasites have gained residence in our alimentary tracts until at the present time a large number of people are infested with them.
2. That such infestation can be demonstrated only by a most careful technic, because of the ease with which this organism is killed outside the body, once it is dejected.

At this point I wish to quote from an article by Dr. W. M. James appearing in the *J. A. M. A.* of October 29, 1927, which reads in part, as follows:

"Recent surveys indicate a prevalance between 5 and 10% in those examined in the United States and England. * * * A peculiarity of gastrointestinal trouble due to *histolytica* infection is that it is chronic, and yields only temporarily and infrequently to dietetic and simple remedial measures. This infection frequently

impairs materially the usefulness and efficiency of the patient, although his general health may be but little affected. * * *

"Survey figures show that one examination uncovers about one-third of the actual number of *histolytica* infections present in a given community; three examinations, between one-half and two-thirds, and six examinations up to about 90%; an indefinite number of examinations may be required before the remaining 10% of infection is found."

I wish to quote also a paragraph from Prof. Clifford Dobell, or the Medical Research Committee of England, instituted in 1915:

"The errors committed by an examiner with little or no previous experience are such that I could not have believed possible, if I had not actually encountered them; and in cases where the health of a patient is at stake, it is, I believe, almost better that no examination at all should be made than that it should be made by an incompetent or inexperienced person."

From these quotations it will be seen that research knowledge relative to this infestation is not so new as many seem to believe. Observations made for the last twenty years are confirmatory of the statements above quoted. Three major propositions are normal conclusions, if we accept these statements as approximately correct. These major propositions may be stated as follows:

1. It is a serious error to rely upon incomplete or hasty laboratory examinations and thereby permit suspected cases to go without the benefit of a conclusive diagnosis when the amebae may be present. (In this connection I have in mind three patients who were sent repeatedly for stool examinations over a period of four or five years. Each time negative reports were returned, although special request was made for careful, thorough search for all kinds of intestinal parasites.)

2. It is an equally serious error to subject a patient to prolonged and strenuous treatment based upon an erroneous diagnosis.

3. Such infestation can be demonstrated only by a most careful technic, because of the ease with which this organism is rendered nonmotile outside the body.

Many other ameboid forms of life may be found in the intestinal canal. The forms most often to be differentiated from the *histolytica* are:

(a) *Entameba nana*
(b) *Iodameba butschlii*
(c) *Entameba coli.*

In addition to these the *Dientameba fragilis* and the flagellate group (of which there are four prominent members), may complicate the picture.

The bodily structure, size and cytoplasmic contents of each type must be known to the protozoologist. The appearance of each of the various stages through which each type passes must likewise be thoroughly mastered.

Furthermore, a thorough mastery of the various staining methods, which may be used for diagnostic purposes, is indispensable when the motile form is not available.

Dr. W. M. James of Herrick Clinic, Panama, writes me that, after twenty-six years of experience, he does not believe that a reliable diagnosis of the *cystic stage* of *Entameba histolytica* can be made without the use of special staining methods in the absence of an acute or sub-acute dysentery. He relies upon wet fixed and iron-hematoxylin preparations in addition to routine eosin and iodine stains.

Dr. James says: "In the fresh warm specimen and under the exact conditions which should be maintained to view the motile *Entameba histolytica*, the characteristics of this parasite are almost finally diagnostic without other measures."

Because of the exacting technic of the stool examination to which my patients were subjected, we continued to find (in patients who are clinically well and free from all symptoms) the parasites in the stools after a brisk purgative was administered. This observation led to the exhibition of many different preparations in the "follow-up" treatment. Approximately a year ago a new preparation was brought to my attention (with very modest claims), to ascertain its clinical value in the treatment of these patients. This substance is described as Diiodohydroxyquinoline, with the chemical formula, $C_9H_4NI_2OH$. The commercial product is sand colored, its melting point is given at 199-201° C., it is 93% pure and contains not less than 63.9% iodine. At least this is the statement made by the chemists responsible for the preparation of this product. It is sold under the trade name of *Diodoquin.

Related drugs in this field of therapy, according to reliable information are $C_9H_4NIOHSO_3Na$ (Chiniofon) having not less than 26.5% iodine,

and $C_9H_4NICLOH$ (Vioform) with an iodine content of 37.5 to 41.5%.

Diodoquin is extremely insoluble in water, dilute acids or alkalies, and only slightly soluble in common organic solvents. I am told that dogs receiving oral doses ranging from 4 to 6 grams per day for a duration of six days failed to develop any toxic symptoms. Most of the drug was recovered in the excretion of these animals.

A report of a study of the metabolism of this drug in rabbits is as follows:

"It is observed that the iodine was not split off from the quinoline nucleus and that the drug was in part excreted in the form of conjugation products." These observations lead me to the conclusion that the therapeutic efficiency of Diodoquin may be comparable to the action of certain catalytic substances.

Its action as an amebicide and as a general intestinal antiseptic is very difficult to understand when one considers the permanency of the chemical bond between the iodine and the quinoline nucleus unless there is some catalytic or comparable action taking place in the intestine.

Clinically my experience with this drug has been so encouraging that I am exhibiting it in many cases of intestinal disturbances presenting the characteristics of an unruly intestinal flora or a suspicion of a chronic low grade ameboid infestation.

In connection with this last mentioned condition I have come to the following conclusions:

1. That we have many remedies which will bring an active disturbance (associated with the discovery of many amebae in the intestinal contents) under quick control.

2. The continuation of cyst forms and a few active amebae after intensive medication, is much more common than generally realized. (To demonstrate the accuracy of this observation the exhaustive methods described above must be employed.)

3. The prevalance of "silent" infestations (without the usual clinical phenomena observed when the patient is made unwell because of the activities of amebae) is still an unexplored field.

4. The theory of the practicality of a quick and complete eradication of the *Entameba histolytica* will in the future be looked back upon as we now regard the *sterilizans-magna* theory of Ehrlich when he was working on the development of Salvarsan.

5. A practical, safe, non-toxic, amebicide and "intestinal antiseptic" is highly desirable for routine use in the treatment of active cases, and cases during the interrupted treatment, of amebic infestation. At this time Diodoquin, in my opinion, meets these requirements.

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AMEBA HISTOLYTICA MASKING ESSENTIAL PATHOLOGY

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Interest in amebiasis revived by the recent Chicago epidemic has lead to meticulous examinations of stools in many patients whose symptoms might be even remotely related to those of amebiasis. So many publications have stressed the embarrassing and even serious errors due to overlooking of amebic infestation that the finding of amebae after a fervid search has been taken to explain the symptoms of many a baffling illness. The search for the underlying pathology often ended too soon with the triumphant finding of amebae in the stool.

Many a neurotic patient having sought for years the cause of a functional illness exults over the report of an inspired laboratory technician that amebae, presumably histolytic, exist in the patient's stools.

In my experience it would be well to halt this enthusiasm with the sober query, "Are the amebae really responsible for this patient's illness?"

Mr. H. had shown gross red blood in his stools for

several weeks. He had also had some generalized abdominal pain. Complete examination including x-ray of the colon had resulted in the only positive finding of ameba histolytica in his stools. No ulcers could be seen with the sigmoidoscope. Complete elimination of the amebae by the usual management did not stop the slight but constant bowel hemorrhages. A later x-ray showed definitely a carcinoma high in the sigmoid.

Mrs. M. had a history of abortions. She had low abdominal pain. Her findings suggested subacute pelvic peritonitis. Ameba histolytica was constantly present in the stools. With the sigmoidoscope the bowel membrane was found to be uninflamed. Following the use of emetin and chiniofen the amebae disappeared and did not return. The patient's pain, now determined to be due to subacute parametritis, persisted.

A man of 40 years dined frequently in loop hotels. He complained of generalized abdominal pain, fatigue and pallor. He used ethyl gas exclusively in his large car. Due to some defect in the mechanism there was such a constant escape of vaporized gasoline into the interior of his car that it was necessary to keep his car windows open. He had a moderate hypochromic anemia and the excretion of lead in his urine and feces was constantly increased to ten times the normal figures. On one occasion the feces sent for quantitative lead analysis were accidentally sent to the bacteriological laboratory. The bacteriologist found ameba histolytica in large numbers. Examination of several more specimens of stool showed ameba histolytica to be constantly present. The patient could not recall having had diarrhea. Pus or blood were never found in his stools. No ulcers were seen in the rectum or sigmoid. Emetin and chiniofen were given. The amebae were abolished without any improvement. The patient recovered when his plumbism disappeared.

A widow 36 years of age had complained of generalized abdominal distress for many years. She had taken cathartics for a long period. Although she had lived in a downtown hotel in Chicago during the World's Fair she had never had diarrhea. The stools were usually long and narrow. She had never seen blood in her stools. Her symptoms were always exaggerated by fatigue or nervousness. Her distress was relieved by belladonna and bromides. She complained of doctors never finding anything wrong with her. She disliked being called "nervous." Her stools contained large amounts of mucus but never showed pus. Proctoscopic examination showed no inflammation as high as eleven inches from the anus. When a zealous worker in the clinic of a large medical school finally was able to culture amebae from the stood the patient was triumphant. At last someone had found the cause of her complaints. She had now a just reason for being ill. Antiamebic medication did away with the organisms. This treatment caused an exaggeration of her symptoms. This patient did not have amebic dysentery. She had an "irritable colon" and the amebae were merely coincidental.

An unmarried woman of 32 had complained of abdominal distress to numerous doctors for many years. They had been unable to find anything organic to explain her symptoms. She had never had diarrhea nor noted blood in her stools. Repeated x-ray and proctoscopic examinations had shown no pathology. Being tense and anxious, the diagnosis of "spastic colitis" or "irritable bowel" seemed entirely fitting. Ameba histolytica was found to be constantly present in her feces. She was made more miserable by the antiamebic medication. Her stools show no amebae on slides or in culture. Her previous complaints recur with fatigue, emotional strain or failure to adhere to the prescribed diet.

SUMMARY

I have described instances of carcinoma of the colon, pelvic cellulitis, lead poisoning and spastic colitis or irritable bowel with coincident ameba histolytica in the feces. In each case the finding of amebae masked or drew attention from the pathological basis of symptoms. Such errors are avoidable by recognizing and properly evaluating the carrier state.

The same tendency to overlook essential pathology occurs with a positive result to any other clinical or laboratory test. I have seen uremia and even pregnancy overlooked on the x-ray demonstration of a niche in the duodenal cap of a patient complaining of vomiting. In endocarditis or tuberculosis a positive Wassermann has served to confuse a diagnostician too laboratory-conscious.

It is granted that true amebiasis may be associated with any other disease. It must also be granted that ameba histolytica may be found in functional diseases symptomatically and etiologically entirely unrelated to the discovered amebae.

The finding of ameba histolytica must not terminate the search for other pathology.

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THE SURGERY OF RETINAL DETACHMENT

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CHICAGO

During the past eight years beginning with 1929, we have operated on about 180 private cases of retinal detachment. To this number may be added some 55 cases more operated on by myself in the clinic or ward services at the Michael Reese Hospital and the Illinois Eye and Ear Infirmary, making a total of 235 cases. This has given us ample opportunity to observe both

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the operative difficulties one may encounter and the end results, which, of course are paramount to the patient.

We began in 1929 by using the Gonin cautery puncture methods exclusively, for in those days there was no other method. The technic at that time consisted of the usual anethesia of the eyeball by means of novocaine, 2% solution, injected sub-conjunctivally following the local installation of one minim of cocaine Hcl 2% solution four times at two minute intervals. After exposing the sclera by appropriate incisions through the conjunctiva directly overlying the area where the retinal tear had been previously localized by means of the ophthalmoscope, a Graefe knife was thrust through the sclera and the hot Pacquelin cautery was inserted into this opening a distance of 2-3 millimeters and held there for from one to ten seconds. The conjunctiva was immediately sutured, atropine instilled and both eyes were kept bandaged for a period of two weeks or less.

The numerous serious complications that resulted from such drastic surgical interference forced us to turn to safer methods of procedure. Our technic was then altered to the extent that we began to use the electric cautery in place of the Pacquelin cautery, as this method reduced somewhat the intensive heat to which the eyeball was exposed. However, there still followed too many intraocular complications to warrant its unrestricted continuance.

About this time Larssen had published his first series of cases in which an adhesive choroiditis was induced by the superfical heating of the sclera to produce reattachment of the retina. At first we used either the Pacquelin or electric cautery directly upon the sclera to produce the necessary heat. Later we used the small ball electrode and a weak diathermy current to accomplish the same object. This was usually followed by puncture of the sclera to allow of the escape of the sub-retinal fluid, while in others it was hoped that the fluid would absorb. Theoretically, operations of this type should be ideal for flat detachments where the retina is elevated only such a small amount that the resultant swelling of the choroid will bring those two structures into opposition, despite the presence of a small amount of sub-retinal fluid.

As the end results were still far from desirable, we began to employ the Guist potassium hydroxide cauterization of the choroid through a trephine aperture in the sclera. This was probably the most difficult of all detachment operations from a technical standpoint, and one that could seldom be carried out as originally planned. There are few operators skilful enough to trephine the posterior sclera in as many cases as required without puncturing the choroid and allowing the eyeball to become too soft for further work. We further altered our operative technic by discarding trephination of the sclera and instead, incised the sclera fibers at right angles as in cyclodialysis, undermining the choroid with the tip of a cyclodialysis spatula, then biting out a V-shaped piece of sclera with a Herbert punch forceps. The exposed choroid was cauterized with the tip or sharpened end of a potassum hydroxide stick and neutralized with very weak solution of acetic acid applied on a finely wound cotton applicator. This punch method obviated somewhat the danger of puncturing the choroid and in our hands was somewhat safer than the trephine method.

The Guist method is very difficult and subject to interruptions during the course of the procedure. The chemical cautery is drastic and has the same objection of mass cauterization as has the Gonin. Intraretinal and vitreous hemorrhages are not uncommon and imperil the success of the operation, even though there may be an anatomical reattachment. The reaction of the eye to the procedure is very severe and the eye remains red and irritated for many months, longer, we believe, than after any of the other types of operation.

We then began the use of the Weve technic. By this is meant multiple punctures of the sclera with the long flexible steel needle with 50 to 75 milliamperes of diathermy current. The endeavor is made with this needle to lay a barrage of punctures around the hole or holes with the purpose of producing an adhesive choroiditis which will hold the retina in place. No endeavor is made to close the retinal tear with a single puncture as is done in the Gonin or Guist operations, but rather to produce an annular choroiditis, in the center of which is the hole in the retina. So, if the hole remains open, seepage into the sub-retinal area is impossible, because of the watertight circular adhesion that is pro-

duced. The number of scleral punctures with the Weve needle varied from fifteen to a maximum of thirty-five.

The Weve technic was a decided improvement upon the previously employed methods, especially in the ease with which it may be performed. However, we believe there are several reasons for the failure of this operation. In the first place, the long needle penetrates too deeply into the eye and frequently comes into contact with the retina. This not only produces a definite damage to the retina, but also fails to produce the requisite choroiditis. When a diathermy needle is introduced into an eye, the cautery effect is produced at two points, namely: at the tip of the needle, and at the point where it first enters the sclera. The contact of the remainder of the shaft with the intraocular tissues is without effect. In the second place, after the first puncture, subretinal fluid or even vitreous begins to seep through the hole left by the withdrawn needle and the eyeball soon becomes so soft that further manipulation is difficult, if not impossible. In the third place, the choroidal lesion produced by the Weve needle is a small round spot and it is very difficult to produce enough such small lesions close enough together to form a water-tight annular choroiditis.

The Safer method has never been employed as our other methods have been almost identical except for the type of needles used. It has given excellent results in Safar's hands.

Our experience with the Walker pins is somewhat limited as we have found the technic more involved and cumbersome than the technic with the so-called "Single Short Needle", which has been evolved by Dr. Harry S. Gradle, the needle used being fully described in the October issue of the *American Journal of Ophthalmology* for 1935. The technic of the operation has been borrowed freely from other sources.

The "Single Short Needle" technic which we have used for the past two years follows. A preoperative sedative should be given in all cases. It is best to use a drug which will not result in nausea and vomiting following the operation, and for this reason the best pre-operative drug, morphine sulph. gr. ¼ and Scopolamine Hbr. gr. 1/150, hypodermically, must be used with extreme caution or not at all. Nembutal grs. jss, Sodium Amytal grs. iij, or Dilaudad grs. ⅛ may be given one hour before operation. The pupil is dilated previously with atropine sulph. 1% solution, to obtain maximum mydriasis. This mydriasis may be augmented by the use of Synephrin 1% solution, instilled previous to operation. Our patients are operated on in a so-called flat cataract bed so that there is no necessity for removing the patient from an operating table. The bed is wheeled directly from the operating room into the patient's room. The conjunctiva and cul-de-sacs are irrigated with normal saline solution or oxycyanide of Mercury 1/10,000 solution in the usual manner. Contrary to the usual technic it is unwise to instill cocaine hydrochloride for surface anesthesia, as the resultant drying of the cornea will obscure any further ophthalmoscopic examinations either during or after the operation, and these examinations may be of vital importance in localizing the sites of the diathermy punctures. While there is no doubt cocaine does result in the best anesthesia, one may instill 1-2 drops of a 2% Butyn solution into the lower cul-de-sac, and shortly thereafter follow with a retrobulbar injection of 1cc. Novocaine, 2% solution, through the lower lid. This anesthesia is augmented by small injections of the same substance into each muscle through the conjunctiva. This usually gives a satisfactory anesthesia. A drop or two of Adrenalin chloride 1/1,000 solution instilled into the cul-de-sac will result in an almost bloodless operative field. The lid speculum is inserted and a curved incision made through the conjunctiva about 10-12 mm. from the limbus and overlying the area containing the tears or the elevated parts of the retina. The recti-muscles encountered in this dissection are carefully isolated and a guide or bridle suture is placed under the muscle insertion and fixed with a hemostat at its distal end for easier manipulation during the operation. The sclera is laid bare and clean directly over the area where the diathermy punctures are to follow. The eyeball is retracted by aid of the bridle sutures so that the extreme posterior part is made easily visible and accessible to the diathermy needle. The speculum is now removed and the lids and incised conjunctiva retracted by means of large muscle hooks or rubber composition retractors, aided by flat spoons inserted into the depths of the wound. One can reach 20-22 mm. posteriorly by this easy method

without severing any of the recti muscles, which naturally obviates any chance for a diplopia resulting from an incorrect muscle suturing. The sclera is dried by cotton sponges. The single short needle is now applied to the desired area, the number of punctures depending upon the size of the area to be cauterized.

The principle of this technic is based to the greatest extent upon the Weve operation, except that the attempt is made to isolate the portion of the retina that contains one or more holes from the remainder of the retina by means of a continuous line of adhesive choroiditis rather than a series of isolated patches. The curved shape of the insulated portion of the needle permits of scleral punctures as far posteriorly as desired.

The single short needle is not plunged through the sclera with current on as is the Weve needle. Instead of being introduced into the sclera radially with complete perforation into the choroid, the needle enters the sclera at an angle of about forty-five degrees, that is, about half way between the radial and the tangential position. In as much as the needle is only one and one-half millimeters long, it is impossible to perforate the sclera in this position. Instead, it produces a linear cauterization rather than a purely punctate affair. Thus, if the insertions of the needles are close enough together, there results a continuous linear searing of the sclera and a linear adhesive choroiditis. In that way, a water-tight line, either single, double, or treble, may be produced that will completely isolate the desired portion of the retina. Of course, the sclera must be punctured in one or two places to allow of an escape of the subretinal fluid so that the retina may fall back upon the adhesive choroiditis. These sclera punctures are made with a Graefe knife, the knife being rotated to allow a sufficient amount of subretinal fluid to escape.

The objection has been raised that with this method, the subretinal fluid or vitreous escapes through the punctures and allows the eyeball to become too soft to permit of adequate punctures. If the needle is inserted through the sclera obliquely as described, not a drop of fluid is lost until desired as there is no communication established between the subretinal space and the outside. Repeatedly we have made as high as eighty punctures without lowering the intraocular tension. We have found it advisable to make the last three or five punctures radially through the sclera to establish fistulization of two or three days duration, over and above that produced by the Graefe knife puncture. After these punctures, the eyeball does become soft.

The retractors are now removed, and an ophthalmoscopic examination is made to ascertain the locations of the diathermy punctures. The speculum is now replaced and the conjunctiva sutured with a single running suture which is not tied at either end, but left loose, so it can be easily removed without any discomfort in 6-7 days. Atropine sulph. ung. 1% is placed in the cul-de-sac and both eyes bandaged. The current used is of approximately 45-60 milliamperes. The patient should be perfectly quiet for the first 3-4 days at least. For detachments in the upper half of the retina, the foot of the bed is elevated six inches or more; with lower half detachments, the head of the bed is elevated or the patient is allowed to lie on a first notch back rest.

We dress our cases daily, but believe that it is best not to do an ophthalmoscopic examination during the first 4-5 days following operation.

There are a few points in the after care that are important: absolute bed rest for at least two weeks after operation is essential. During that time both eyes are bandaged. Hole spectacles can then be used, but the hole should not exceed two millimeters. This can be gradually enlarged so that at the end of another three weeks, the hole is 10 millimeters in size, reading must be avoided and atropine should be used for at least four to eight weeks. Physical exertion must be kept to a minimum and all jolts and jars are dangerous. No attempt to resume normal habits of life should be made for at least ten to twelve weeks after operation.

If the first operation is a failure so that a second surgical procedure is indicated, it should not be done too early. We know that there is a delayed or slow action in many of these cases that are treated with diathermy and ultimate reattachment may not occur for many weeks. While waiting to perform the second procedure, the patient must be kept physically inactive and the eye must be kept at rest with atropine and hole spectacles. Empirically one may say that

the second operation should not be done until at least two or three months have elapsed after the first.

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DISCUSSION

DR. HARRY WOODRUFF, Joliet: I think this method Dr. Meyer suggests, the use of the diathermy needle of Dr. Gradle is promising, because if anyone has attempted to perform the Walker operation, putting in all those platinum points, you know how tedious it is. The technic is difficult, and the likelihood of one or more of the points coming out when you are operating, letting out some subretinal fluid—the very thing you do not want to happen—is great. It is encouraging to know that we have at least 50% chance of cure. I approve of the anesthesia mentioned. I have used avertin with satisfaction. I believe it saves the operator as well as the patient a good deal of strain.

DR. C. B. VOIGT, Mattoon: One of the most important things that has happened in recent years in eye surgery is the development of the effective methods for the cure of retinal detachment. And our enthusiasm on account of the results that are being obtained is well justified. We are probably all in accord with the idea that the principles on which the operative procedures depend is the proper one, the idea being of course to get a reaction in the choroid with the hope that the inflammatory process will cause adhesion between the choroid and the retina. For many years such means as the actual cautery to the sclera both with puncture and with the electrolysis and injections of iodine were used, but no definite technic was followed up persistently until Gonin made known his procedure and announced his results. There is no doubt that we now cure a large percentage of retinal detachments.

It is not at all likely that any of these procedures, such as using the cautery puncture or the chemical cautery, or even some form of electrocoagulation, will be the final procedure adopted. The difficult problem is to produce permanent adhesion between retina and the choroid with the least possible traumatism. I am sure that from time to time we will have presented ways and means of carrying out this principle in handling a retinal detachment which will do much less injury to the eye than those previously practiced.

The consensus of opinion at present seems to indicate that thermo-puncture is the most effective surgical treatment of retinal detachment. The action of chemicals such as strong caustics, potassium hydroxide and the like, the use of the actual cautery with its mass production of heat, etc., are more difficult to control, especially in an already disturbed eye, than heat applied under control with the diathermy needle.

The essayist brings to our attention one more method —or shall I say modification with refinements of the earlier diathermy procedures. The curved shape of the needle gives greater ease and accuracy in placing the scleral punctures; the diagonal line of application through the sclera without entire perforation of this anatomic structure; and the circular placement of the needle applications with the ring-like effect of cohesive retinitis produced, are to be commended.

Dr. Meyer is to be congratulated upon the splendid presentation; his clear, lucid, concise statements which are readily followed, and the short description of the preparation of the patient, the production of anesthesia and the simple yet effective exposure of the field, are models of brevity and conciseness. Practically all the objections to previously described operations are obviated, the eyeball retains its tension until the ring of scleral punctures is complete and the operation almost finished, and the final punctures for the escape of the subretinal fluid made, which of course is attended with softening of the eyeball. I am sure he must have especially good results in the restoration of vision following this technic, and we would have been pleased to have a short report of his cases to date. Perhaps we may be favored with such a report at a subsequent meeting of this section.

DR. O. B. NUGENT, Chicago: I was very much interested in Dr. Meyer's presentation. He has brought up some points which are unusually valuable. Personally I quite a while ago discarded the ammeter from my machine. I believe we can tell better the type of coagulation we are getting of the sclera by simply watching the ring formation around the needle. I have used in recent cases with better results the one-meter wave length, without the indifferent electrode. In that way I get much better coagulation in a shorter time. It is not so deep that it produces any over-coagulation of the choroid, unless I leave the current on long enough. This can be controlled. If the patient has a thick sclera a longer application will produce deep coagulation. It is necessary to use less in cases of myopia because the sclera is thin, and sometimes it is not advisable to use the needle at all. Following the completion of the punctures I find a great deal of value in making two or three trephine openings. With the motor driven trephine one does not have to depend on intraocular tension to produce a trephine opening in the sclera.

DR. D. C. ORCUTT, Chicago: I have been learning caution during the past two years. Prior to that time we used various methods, used the Walker with indifferent results, but during the past two years I have found it is well to watch a case a day or two or more, before operating. For that reason we put them to bed. We have made a schematic drawing of the detachment prior to putting them to bed. It is surprising the number of detachments that subside. They go down almost to nothing if you keep the patient perfectly quiet. Then without disturbing them or letting them sit up, put them on the table, and I have a very fine cautery point, almost needle-like in size, with which I make one or two trephine openings, ½ to 1 mm. in size, over the point decided by the schematic drawing or the hole if we have been able to locate it, and first we touch with this fine needle in the trephine opening, possibly not do more than puncture the choroid, but carrying it around and forming coagulation and then making several punctures around the opening. The success we

have had in some one-half dozen cases in the last year has been very flattering by this method. I had a letter from one patient, a farmer, the other day. He was sent home in February and he tells me he is working every day on the farm and so far as he could tell that eye was about as good as the other one.

Dr. M. L. Folk, Chicago: There is one thing that has not been described here—it is not used in this country—that is the circular button Lindner uses around the limbus. It has prongs attached to it, the prongs coming out from the center, and when the tear is localized the end of the prong can be placed over the scar. Even when the eye is dislocated it can be used to identify the meridian; otherwise, when the eye is turned you lose the meridian. I brought one from Vienna in 1930 and have found it of great help.

Dr. Meyer's paper has been very interesting. I would like to ask one question about this new Gradle electrode. We know the sclera has different thicknesses at various parts, and is thicker toward the equator. If you use the same electrode how do you gauge the amount of penetration into the sclera? When you go through the sclera, and you touch the choroid you know you are going to have an adhesive choroiditis, but if you do not do so, you will not get this adhesive choroiditis.

Dr. S. J. Meyer, Chicago (closing): I am glad that Dr. Woodruff took up the discussion of anesthesia. There are some patients you cannot anesthetize properly and perform the operation upon with any success. I know of one ophthalmologist who has operated on a girl three times, and all three times she screamed during the operation. Avertin can be used; how safe it is I do not know. They have had two fatalities at Michael Reese Hospital and they are afraid of it. Meesman of Germany advises sodium evipan, which is a barbital product, injected intravenously. It does not work long enough for an operation like retinal detachment. Sometimes you can perform the operation in twenty minutes, but sometimes you cannot, and if you repeat the anesthesia you lose control.

It is important not to repeat the operation too early. An instance of that was brought to my attention several weeks ago. He was a doctor who had moderate myopia and a definite tear in the upper quadrant. I did what I thought was a perfect operation, making about twenty-five punctures. Everything looked flat. I could see where I made three or four punctures, areas of chorio-retinitis showing through. He was kept in bed for nine days, and I noticed I could see something white through the pupil. After the fourth day there was a complete choroidal detachment—besides the original retinal detachment which had not flattened down. I sent him home. In the first nine days the choroidal detachment did not disappear. After about four weeks he returned, just two weeks ago, with complete reattachment of the choroidal detachment and complete reattachment of the retinal detachment. I saw him Saturday, six weeks after operation, and the entire retina was flat. Unfortunately he will probably develop a central scotoma because it already shows some change. You usually get a soft eyeball following operation and if you go in too soon you will have a chronic uveitis develop.

Many hospitals cannot afford a Walker outfit, and you do not need one. All we use is the diathermy machine that belongs to the hospital and the needle costs about $7.00. You must use the smallest amount of current you can get through the large machine. As to how much to perforate the sclera—you soon learn how to go deep enough and yet not too deep. As to whether you have to go through one-half or two-thirds of the sclera to produce an adhesive choroiditis, I do not know. I think one should err on the side of safety and not go too deep.

THE TREATMENT OF OPHTHALMIA NEONATORUM

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Ophthalmia neonatorum is a term which includes all infections of the conjunctiva occurring in the newborn. Reports differ as to the number of cases of ophthalmia neonatorum that are caused by the gonococcus. Lazar's[1] report states: "That of 86 cases, 36 cases or 42% were caused by the Neisser's organism; the remained showed either no organisms or one of the following: pneumococcus, staphylococcus, mixed organisms, Morax-Axenfeld bacillus, and inclusion bodies."

Ohio reports (The Sight-Saving Review[2]) "That 1059 cases of ophthalmia neonatorum were reported during 1933, of which 21 were due to the gonococcus." This report is of 188 cases of ophthalmia neonatorum which were treated at the Cook County Hospital in a period extending over three years. Eighty-five cases or 45% were due to gonorrheal infection. The remaining cases were due to other causes and are grouped under the term of non-specific conjunctivitis. Emphasis here is placed upon the gonorrheal type.

Of the 85 cases of gonorrheal ophthalmia neonatorum, 38 were born at the Cook County Hospital. During this time there were 13,132 births at this institution, a morbidity of less than 0.3%. Since the patients are of the lower strata of society and are of a group in whom venereal infection is quite common, this incidence is very low and is comparable to the morbidity in other hospitals. (Before the use

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of prophylaxis, Crede[3] stated "that the incidence of ophthalmia neonatorum was 13.6%").

The treatment of ophthalmia neonatorum of gonorrheal origin is mainly a problem in prevention and should begin during the prenatal period. Lehrfeld[4] reports "that in two hospitals, where the expectant mother is treated for gonorrhea, the incidence of ophthalmia neonatorum was seven to ten respectively per thousand births. In two other hospitals where no routine procedure is carried out to discover gonorrhea in the expectant mother, the incidence was 61 and 36 per thousand births. However, stressing of the prenatal care must not be allowed to lessen the emphasis on the use of a prophylactic.

What drug should be used in prophylaxis? In spite of such reports as Chambers[5] who advocates the use of 1% mercurochrome solution, and Mayou[6] who relies on protargol or acriflavin oil for prophylaxis of gonorrheal ophthalmia neonatorum, and many similar reports, the consensus of opinion is: that silver nitrate is far superior to all substitutes.

At a meeting of the New York State Commission for the Blind on March 2, 1934, there was a unanimous agreement by all physicians present that silver nitrate should be used and no substitute be permitted. S. R. Gifford[8] writes: "As to the efficacy of argyrol in mind, one must consider its use for prophylaxis as nothing more than an irrigation, which is as likely to carry gonococci into the sac as to wash them out. The establishment of such a procedure as a routine measure in hospitals is a complete abdication of the idea of prophylaxis, and ophthalmologists should insist on the use of either a 2% silver nitrate neutralized by normal saline after 15 seconds or 1% silver nitrate not neutralized."

The routine treatment carried out at the Cook County Hospital is as follows: Any secretion or inflammation appearing in the eye of a newborn is viewed with suspicion. An epithelial scraping is made (this is necessary because at an early stage of the disease organisms are seldom found in the discharge. The gonococcus is an epithelial parasite and does not appear in the discharge until these cells are cast off).

All suspicious cases are immediately isolated and treated as cases of gonorrheal ophthalmia neonatorum. Until the gonococcus has been found, the infants are separated from the proved cases. Thus much valuable time is saved in instituting treatment which is a point of great importance in the prevention of corneal complications.

The first consideration in the treatment of the gonorrheal infection is to keep, by means of frequent irrigations, the eye free from discharge. Retained perulent discharge has a lytic effect on the tissues and it is important that no such process be permitted to take place on the cornea. Irrigations of the eye with saline or boric acid solutions are carried out every thirty minutes or even oftener day and night. As the discharge lessens the frequency of the irrigations is diminished. It is needless to say that care must be exercised in order that the cornea is not injured during this procedure. Such an accident may occur from inexpert turning of the lids, or directing a strong stream of fluid upon the cornea, or contact of the cornea with the tip of the nozzle.

In nearly all cases except the very mild ones, foreign protein in the form of milk boiled for three minutes and then cooled to body temperature is used. The amount of milk that is usually injected is from 1 to 2 cc. depending upon the size of the infant. The injection is repeated every second or third day, if necessary. In this respect Redding's report is of great interest. Redding injects 1 cc. of the mother's milk without previous boiling. He states, "that the results are so remarkable that no other treatment is necessary except ordinary cleanliness."

The chemosis and discharge are greatly lessened after the use of milk, thus there is seldom the need for performing a canthotomy in these cases.

What antiseptic should be used? The antiseptics most commonly used in the treatment of gonorrheal ophthalmia neonatorum are silver nitrate and the silver protein salts. Silver nitrate is of little value in the early cases, it seems, in fact, to increase the amount of swelling and discharge. Argyrol, one of the organic silver salts, appears to be worthless, as is shown by the data that follows.

Because of the large number of preparations on the market and the limited number of cases, one can test a few mucous membrane antiseptics only. The antiseptics used were the following:

Aqueous solutions of acriflavin 1-1500 and Metaphen 1-2500, Mercuric oxycyanide 1-5000 and Argyrol 10%. The antiseptic solution was dropped into the conjunctival sac of the eye that appeared to be the worse. It was used three times daily.

Number of Days Required to Obtain Two Consecutive Negative Smears

Irrigations and	Number of Patients	Number of days	Average Number of days
1-1500 Acriflavin..	9	16 36 20 31 7 46 16 15 10 22	
Irrigations alone.....		22 36 50 48 5 77 20 28 55 38	
Irrigations and 1-2500 Metaphen...	4	66 29 30 17	31
Irrigations alone.....		64 14 45 17	35
Irrigations and Merc. Oxycyanide 1-5000 solution.....	4	30 50 25 41	36.5
Irrigations alone.....		46 72 25 41	46
Irrigations and Argyrol 10%.....	3	33 65 44	47
Irrigations alone.....		30 65 37	45

A study of the above table shows that solutions of 1-1500 Acriflavin, 1-2500 Metaphen and 1-5000 Mercuric oxycyanide shortened the period of morbidity sixteen, four and ten days respectively. Argyrol had no appreciable effect in this respect. Further work along this line is to be continued.

Complications and their treatment. Of the 85 cases of ophthalmia neonatorum only one developed a corneal complication while under treatment and this was readily controlled by a delimiting keratotomy. Only a slight scarring of the cornea resulted. Four infants entered the hospital with involvement of the cornea; in one this condition was bilateral.

A diffuse corneal haze seen in severe cases with marked chemosis which is due to an edema of the cornea should be differentiated from a true corneal infiltration, which is usually well defined in character. The former condition requires no special treatment while the latter condition necessitates immediate energetic measures if the eye is to be saved. In addition to the use of atropine, the area, if small, is treated with trichloracetic acid as described by Gifford. If the condition progresses, a delimiting heratotomy is performed. The wound is opened daily by depressing the lips which allows the aqueous to escape. When the ulceration of the cornea is extensive or if there is an impending spontaneous perforation, a sliding conjunctival flap is drawn over the cornea. This procedure by bringing a fresh blood supply to the cornea arrests the ulcerative process and prevents the escape of the crystalline lens.

CONCLUSIONS

1. The treatment of gonorrheal ophthalmia neonatorum is chiefly a problem in prevention.
2. No substitute should be used for silver nitrate in carrying out prophylaxis.
3. In the order of their importance in the treatment of gonorrheal ophthalmia neonatorum are irrigation, foreign protein therapy and the use of antiseptic solutions.
4. Silver protein salts have no place either in the prophylaxis or in the treatment of this condition.
5. Finally, the use of a 1-1500 acriflavin solution has been found to shorten the period of morbidity.

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DISCUSSION

DR. M. L. FOLK, Chicago: The treatment as outlined by Dr. Bellows is the generally accepted treatment throughout the largest hospitals. I think one thing should be stressed—the determination of whether it is specific or non-specific plays an unimportant rôle. We have had corneal complications and loss of eyes in non-specific as well as specific cases, and most of the series studied will show only 45% of Neisserian infection, and yet we get the same complications and loss of the eyes. The infant has not acquired any immunity yet and even mild infection with colon bacillus or pneumococci has caused the loss of many eyes. Therefore, all cases should be treated as if of gonorrheal origin.

I think we irrigate the eyes too often. Every thirty minutes is too often; it disturbs the child too much and lowers its resistance which will not help in the recovery of the eye. Every two hours is sufficient. Dr. Wilder once questioned me on this, and he said he had seen the loss of eyes due to too frequent irrigation. You can wash it off with boric acid externally, but so far as irrigating it, I believe it is harmful if done too frequently. We have had as good results with mercurochrome used four or five times a day (two per cent.) as with acriflavin.

In Dr. Bellows' series some cases where irrigations alone were used had a convalescence of thirty to thirty-five days, the same as when medication had been used. This shows you cannot rely on statistics. I think both mercurochrome and acriflavin are good, in addition to milk. Foreign protein works well in conjunctivitis, but it has a deleterious effect on the cornea once the

disease has involved the latter; before that it is of great value.

DR. H. C. EASTMAN, Galesburg: I would like to ask Dr. Bellows what method is used for opening the infant's eye, and also if he uses ice?

DR. JOHN G. BELLOWS, Chicago (closing): To open an infant's eye we use the following method: A toothpick with cotton wound tightly at its end is placed at the lid margin and with a twisting motion the lid is rolled away from the eyeball. This exposes the cornea.

EARLY MANIFESTATIONS OF MENTAL DISORDERS

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This paper deals with the problem of the recognition of impending mental disorder. Well marked symptoms of insanity are usually appreciated but the question to be considered here is whether one can suspect the approaching illness before profound manifestations appear.

One might take up each of the more common psychoses and tabulate those changes which were noted at first. It is the belief of the writer that a better understanding of the problem will be had if it is approached by a consideration of the so-called "normal mind" and an attempt to indicate the change which occurs when disorder develops. If this method is followed it is necessary to discuss personality factors. This will be done very briefly. For an adequate consideration of personality the reader is referred to the numerous illuminating articles which have been written on the subject. This paper is, in intent, descriptive rather than analytical.

Some of the attributes of the ordinary mind are; consciousness, stability of mood, judgment, memory, interest, integration, and the ability to sublimate.

No one should expect that in any individual such qualities as those just mentioned will rate 100% at all times. Besides a lowering of the usual efficiency of these qualities there are many features that suggest that all is not ideal in the functioning of the nervous system. A few of these are; apathy, excitability, anxiety, insomnia, fatiguability, suspiciousness and the unsociability. These are common. The fact is that if irritability, anxiety, insomnia or jealousy, to mention these features at random, indicate a faulty adjustment most all of us are guilty at times. Yet it is true that any one of these may be a symptom of early, or late, mental disorder.

What can be said that will bring some sort of order out of the apparent confusion in the foregoing statements? Unfortunately there is no yardstick which unerringly will measure mental symptoms. Yet there are hints that may be helpful.

The ordinary make-up of the individual may show such degree of conflict or difficulty in adjusting adequately to common problems that a flight from realities seems a distinct possibility.

An apparent change in disposition is one thing that may put the family or the physician on guard. The fact that a man who previously had shown little tendency to irritability begins to show marked irascibility is worth noting. Frequently early symptoms of mental disease are shown not by what seems to be an alteration in type of disposition but by an exaggeration, either in intensity or duration, of characteristics previously noted. A word of warning may be given here. A patient who has shown a definite change for a period of several weeks may manifest no unusual traits on many days during that period. In such cases much depends upon an authentic history. It is quite unfair to the physician to expect a definite opinion given merely on the basis of one examination. It is true that mental disorder seems to develop abruptly at times but careful inquiry will in many instances reveal changes in speech and behavior which passed unnoticed at the time.

One question that is worth considering is how disabling a personality feature has become. Can the individual control his irritability enough of the time that he continues to hold his family and his business together or is he so unpleasant that he is gradually driving away all on whom his satisfaction in life really depends. Does a person realize his day-dreams are indulgences which must be squared with realities if they are to pay dividends or, if not, at least recognized as wishful thinking, or are they so fantastic and demanding that the subject can no longer remain oriented to reality. In a word do the personality features prevent a passable adjustment to domestic, social and economic life.

It is well to make inquiry regarding the oc-

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currence of precipitating factors. One expects a person may not be quite as usual after a failure in business, a death in the family, or an exhaustive illness. The history of the reaction following similar stresses in the past may be enlightening. It may be found that the individual is showing so much greater change at present than following a like stress of five, ten or twenty years ago that one is suspicious that a profound alteration in ability to remain stable has occurred. Or following a previous stress the person may have developed a definite mental disorder and one appreciates that similar strains sustained by this individual may again precipitate a psychosis.

The foregoing remarks are made with the hope that although very general in character they may aid in the detection of signs which indicate the possibility of the development of psychic disturbances. If one goes a step further the various types of mental disorders come to mind. This paper is not concerned with classification. There are too many different types to present here but brief reference to some of the more common disorders may help in illustrating their development.

As is well known, paretics in the early stages of the disease may have symptoms of the psychoneuroses, of a manic or a depressed state, or manifest a general lowering of vigor with leveling of the emotions and interests. Early judgment defect may be shown by delinquencies and business ventures of a type which are entirely out of keeping with former principles and practices. Even in paresis there may be some similarity between the symptoms shown and the usual personality but the study of the personality is less illuminating than in the functional disturbances. The fact that there is a definite change in the personality is the important feature.

Manic attacks may develop rather abruptly. Not infrequently the disorder is mild in the early stages or even throughout. There is increased activity which is shown by restlessness and by a tendency to talk more and to do more. Distractibility is indicated by the variety of plans, actions and subjects of conversation. The patient is inclined to be expansive with considerable impatience and irritability. She seems logical in speech and action until one reviews the activities over a period of time. Then the exaggerated tempo of her condition stands out clearly. Perhaps it is only when one views the condition in this manner that the disorder is recognized. Until placed under management these patients lead a merry life, and those who are responsible for them lead a full life but not a merry one.

A few cases may be cited. No attempt will be made to give an adequate case history. The purpose is to illustrate in an abbreviated manner the development of the psychoses. It is hoped that the transition during stress of a particular type of personality into a psychosis will be indicated.

M. A.—There was a history of dysmenorrhea and migraine. Although she "liked to cut-up" and was jolly, social and a leader in play among friends, she tired easily and became depressed when fatigued. After heavy work she did not feel her usual self for a day or two. She was sensitive and if criticised would go off by herself and cry. While backward among strangers she was not seclusive and did not day-dream.

When at the age of 17 she obtained work calling for energy required of an adult she gradually showed fatigue and depression an increasing proportion of the time. She felt she had to drive herself to work to keep going. On advice she quit work and was treated by a physician for whom she formed an unwise and unreciprocated attachment to which she evidently could not adequately adjust. She became melancholy and stubborn; would lie in bed for days without eating and spoke of suicide. Increasing severity of the condition led to commitment at twenty-one and a diagnosis of the depressed phase of manic depressive insanity.

No one's personality is so simple that it can be described in a few words or adequately identified by any sort of "rubber-stamp" label. It can be said however that M. A. showed an emotionally unstable make-up, and the statement regarding her love affair indicates a lack of ability; first, to avoid unwise entanglements and; second, to extricate herself from them without such upheaval as was manifested by a psychosis.

V. S.—This patient was seclusive; walked alone and kept to herself. She had no friends of either sex. She did not care for picnics or dances and if company came to the house she would not eat at the table with them. She talked very little, cried readily and was apt to go to her room saying everybody "jumped on" her. She did not like to read stories but did read prayer-books and liked to go to church.

At thirty after a disappointment in love, the patient disappeared one night leaving a note in which she said she was going to take her life. She returned the next day saying she had walked all night but did not remember where she had been. A cousin said she became

"mixed in her head" at this time. She ceased work and frequently went to church to pray. She said she did not wish to see anybody, remained in her room a large part of the time and was in bed a great deal. She developed the idea that people talked about her and that they said she couldn't go to work. At this time she was committed and showed symptoms which led to the classification of dementia praecox, hebephrenic type.

Here, as is true in regard to other cases mentioned in the paper, the personality is not fully described but is merely hinted at in a brief sketch. Yet one gains the impression that V. S. developed no real interests and that while day-dreaming is not mentioned, the absence of contacts and interests would tend to lead her into fantasies. Her reaction to the thought that others jumped on her suggests a lack of even half-hearted defense. One would suspect she was not well able to hold a lover and that if he were faithless she would be driven yet further from adequate behavior.

F. M.—This patient was a successful and skillful dress-maker; a very good worker. She did not get along well with strangers, was not sociable, and had no friends. She lived and worked with a sister and was the leader of the two. While not so quick tempered as the sister, when angry she remained so longer. She took a personal view of any restrictions and accepted without question her sister's statements if the latter had any difference of opinion with others. There was a lack of ability to consider others when her own wants or those of her sister were in question.

According to the patient at the age of thirty-eight she patented a certain style of petticoat. The same style was placed on sale by a large store. Legal action on part of patient stopped the sale and the store having suffered a loss thereafter persecuted the patient in various ways. After demanding a seat in a street car before she would pay her fare the street car company also began to persecute the patient. The delusional trend widened to include the bank in which the patient deposited her money and of which the owner, of the store mentioned, was a director. The delusions later included newspapers and almost every thing which touched her life. Hallucinosis and finally a refusal to go out of the house and to pay rent led to removal to an institution.

Even in so brief a sketch as the foregoing one can see the evolution of a paranoic personality into a paranoic psychosis.

M. M.—This patient had severe headaches at the menstrual periods. She was not of a dominant type but while not as social as most she was not seclusive. There is no history of a tendency to day-dream although she was apt to keep "serious thoughts" to herself. She was a light sleeper—would nap during the day but get up at night and do some work.

At twenty-nine after the father had serious financial difficulties the patient suffered from a nervous disorder lasting one year.

At thirty-eight there were a number of unusual stresses. The husband had to change his occupation several times and this bothered the patient greatly. One child had an appendectomy and another a tonsillectomy. During the illnesses the patient spent much time with the children and lost sleep. She tried to stay awake so that she could fan them, the weather being hot.

When the children returned from the hospital the patient seemed to "give up." She appeared weak, laid about the house and slept a great deal. On occasion she talked volubly of matters which had worried her, a reaction unusual for her. She began to be absent minded and stared into the distance. The speech became irrational and at times she did not seem to recognize people. Later a more definite clouding of conscious with sense-falsifications led to the classification of an exhaustion delirium.

In this case a lack of vigor would seem to stand out as a prominent feature in the make-up.

If an attempt is made briefly to summarize the contents of this paper it may be said that in the effort to recognize the possibility of oncoming mental disorder, a history of the usual personality features of the individual, inquiry as to the occurrence of especial stresses, and particularly an evaluation of recent changes which may be shown in the personality, are of value.

INTRAPERITONEAL AND VISCERAL TEMPERATURE VALUES AS INFLUENCED BY EXTERNAL ENVIRONMENT

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The custom of applying heat or cold to the abdominal wall for the relief of pain within the abdominal cavity is very ancient. That this method is often effective is a fact of common knowledge. The careful observation of intraperitoneal changes of temperature when heat or cold is applied externally seems a logical step to ascertain the mode of action of these physiotherapeutic agents. In arriving at the data which are here presented guinea pigs and rabbits were used in the laboratory, surgical patients in the operating room, and a few medical patients in the wards.

Thesis submitted by Dr. Bryant R. Selden to the Faculty of the Graduate School of the University of Pennsylvania in partial fulfillment of the requirements for the degree of Master of Science in Surgery.

Investigations carried on in the clinical and pathological laboratories of St. Luke's Hospital, Bethlehem, Penn.

Our thermoelectric determinations were made by means of a portable thermoelectric apparatus constructed to suit our individual requirements by Dr. B. McGlone, of the Department of Physiology, Medical School, University of Pennsylvania. Dr. McGlone has done much original work with thermocouples, and both by theory and by application has found insulated constantan and manganin wires of No. 26 gauge to work the most satisfactorily. We had four special electrodes built, and were then equipped to determine the temperature of any tissue of the body. The terminals were detachable, and before use in the intraperitoneal cavity of a patient they were autoclaved at fifteen pounds pressure for twenty minutes. We had no deleterious effects from these determinations in any of the fifteen patients examined on the operating table, or the two medical cases (ascites) examined in the ward. In the special terminal constructed for these latter two cases a No. 14 French catheter was used.

Standardizations of the thermocouples were made daily. It was found that in all the terminals except the skin terminal there were at times marked shifts of the apparent zero (i. e., parasitic currents). In the skin terminal the changes were not so great. Marked variations in normal temperatures, at least in the external temperatures, came from the struggles of the animal which had just had a subcutaneous injection of sodium amytal followed by the insertion of a rectal thermometer. The animals which did not resent this routine procedure had no marked rise in temperature. Hence, the more nearly accurate temperatures for undisturbed guinea pigs would be those of the lower values.

The determinations were made upon the animals while they were under the influence of small doses of sodium amytal, injected hypodermically, and repeated as needed. Just enough was given to prevent the animals from moving and suffering pain, except in the use of the diathermy in which case it became necessary to give very large doses to prevent excessive hyperventilation, as the hyperventilation tended to lower the temperature. Thus the experimental responses of the animals especially in the application of heat and cold approached those of the true responses of patients. In taking all determinations upon the animals each animal lay upon its left side, the abdominal incision was made in the center of the midline, and cold or heat was applied to the right (or upper) side.

Always upon opening the peritoneal cavity the temperature noted there would be less than the temperature found—using the same terminal—between the legs or upon the upper body surface. The cause was presumably the entrance of air at a lower (room) temperature. The temperatures recorded in the tables were *maximum* temperatures, i. e., the terminal would be held in the same place for from three to five minutes—in all cases until there had been a full minute of contact with no further rise in temperature. Hence these tables represent selected values from great numbers of individual observations. The great variations and low values of the rectal temperatures were possibly caused by fecal contamination. Because of this same great variability, the rectal temperatures were not considered to be of great significance. They were included in the tables because of the interest in their variations, and to show that the ordinary use of a rectal thermometer, contrary to the opinion of some, may be as full of errors as the use of the oral thermometer.

EXPERIMENT ONE—TEST OF NORMALS

The normal intraperitoneal temperature of the different regions was found to vary somewhat in the different individual animals. In practically all instances, both with guinea pigs and with rabbits, it was noted that a very warm location was just beneath the upper parietal wall. The temperature in the center mass of intestines was usually the same or very slightly lower. The temperature in the pelvis was usually slightly lower than that of the right (upper) side; and the temperature with the terminal against the diaphragm was usually equal to or slightly above that beneath the upper parietes. The comparative temperature values above the lower parietes varied considerably, probably influenced by the temperature of the table upon which the animal lay. The temperature just inside the peritoneal cavity was lowest of all. If the opening was small and the viscera undisturbed for a period of time this value tended to more nearly approach the average intraperitoneal temperature value. For normal values see Tables 1 to 4.

TABLE 1—GUINEA PIGS

Normal External Surface Temperatures

	Rectum	Between the hind legs	Between the front legs	Center midline of abdomen	Center of upper side
Animal No. 1	39.6	39.0	38.7	38.5	38.8
Animal No. 2	38.1	37.6	37.7	36.9	37.5
Animal No. 3	37.8	38.1	38.2	36.7	37.9
Animal No. 4	38.1	38.3	38.5	38.2	38.4
Animal No. 5	38.0	38.2	38.8	38.2	38.8
Animal No. 6	34.9	36.1	37.2	36.2	37.1
Animal No. 7	39.0	37.1	38.3	37.5	38.5

Animal No. 8	35.3	38.0	38.1	37.8	38.0
Animal No. 9	36.2	39.2	39.1	38.7	39.0
Animal No. 10	35.6	38.5	38.7	39.4	38.5
Animal No. 11	36.3	36.2	36.8	36.4	36.5
Animal No. 12	36.7	36.7	37.4	37.2	36.7
Average	37.1	37.7	38.1	37.6	38.0

TABLE 2—GUINEA PIGS

Normal Intraperitoneal Temperatures

	Rectum	Beneath upper parietes	Center mass of intestines	Pelvis	Beneath the diaphragm	Just inside incision	Above lower parietes
Animal No. 1	39.6	38.9	38.8	38.9	38.2	38.4	38.1
Animal No. 2	38.1	37.5	37.8	37.3	37.6	37.1	37.4
Animal No. 3	37.8	38.1	38.1	37.9	38.2	37.8	38.1
Animal No. 4	38.1	39.6	39.5	39.4	39.1	38.7	39.7
Animal No. 5	37.9	38.4	38.3	38.2	38.4	37.5	38.1
Animal No. 6	34.9	37.0	36.9	36.8	37.1	36.8	37.1
Animal No. 7	39.0	39.0	39.9	38.9	40.1	38.2	39.3
Animal No. 8	35.3	37.4	37.9	37.1	38.0	36.8	37.0
Animal No. 9	34.6	37.0	37.2	36.5	37.4	36.8	36.4
Animal No. 10	33.9	39.6	38.7	38.4	38.8	38.2	38.9
Animal No. 11	35.0	37.9	37.8	37.6	37.8	37.5	37.2
Animal No. 12	37.5	38.6	38.7	38.4	38.8	38.2	38.9
Average	36.8	38.0	38.1	37.7	38.1	37.5	37.7

TABLE 3—RABBITS

Normal External Surface Temperatures

	Rectum	Between the hind legs	Between the front legs	Center of midline of abdomen	Center of upper side
Animal No. 1	39.1	38.6	38.0	37.4	37.9
Animal No. 2	37.9	39.7	40.2	39.9	39.8
Animal No. 3	38.5	39.7	39.5	39.4	39.6
Animal No. 4	37.6	39.7	39.4	39.5	40.0
Animal No. 5	37.8	37.8	40.4	40.0	40.3
Animal No. 6	37.6	39.2	38.9	38.7	39.0
Average	38.1	39.6	39.3	39.1	39.5

TABLE 4—RABBITS

Normal Intraperitoneal Temperatures

	Rectum	Beneath upper parietes	Center mass of intestines	Pelvis	Beneath the diaphragm	Just inside peritoneal cavity	Above lower parietes
Animal No. 2	37.8	38.5	39.0	38.8	38.9	38.1	39.1
Animal No. 3	38.5	40.0	38.8	38.7	39.8	39.1	39.6
Animal No. 1	38.5	39.1	40.3	39.3	39.4	39.1	39.4
Animal No. 4	39.1	40.0	39.9	39.9	40.0	39.2	39.7
Animal No. 5	37.5	37.9	37.4	38.8	39.4	38.9	37.4
Animal No. 6	39.2	39.1	39.2	39.2	39.1	37.3	39.1
Average	38.4	39.1	39.1	39.1	39.4	38.6	39.0

EXPERIMENT TWO—EFFECT OF COLD

In studying the effects of cold the animal lay on its left side and the use of icebags was employed. These were supported upon each side, and allowed to rest upon the upper (right) side of the animal. In the case of the guinea pigs covers were used upon the bags in the same manner that they are upon patients. The rabbits had long fur and the covers of the ice bags were removed during the experiments.

TABLE 5—GUINEA PIGS

The Effect of Cold Applied to the Abdominal Wall Upon the Temperature in Various Parts of the Intraperitoneal Cavity

	Rectum	Beneath upper parietes	Beneath the diaphragm	Center of mass of intestines	Above lower parietes	Pelvis	Just inside incision
Animal No. 1							
Before	37.7	37.1	37.2	37.4	36.2	36.9	36.7
34 min. After	33.0	23.6	30.8	31.3	32.4	30.3	31.8
Decrease	4.7	13.5	6.5	6.1	3.7	6.6	4.9
Animal No. 2*	37.9	38.4	38.4	38.3	37.7	38.2	37.5
18 min.	33.9	29.4	34.2	34.3	35.6	33.9	34.3
	4.0	9.0	4.2	4.0	2.1	4.4	3.1
Animal No. 3	34.9	37.0	37.1	36.9	36.1	36.8	36.8
45 min.	30.2	24.5	30.9	30.7	32.6	30.5	32.5
	4.7	12.5	6.2	6.2	3.5	6.3	4.1
Animal No. 4	34.0	35.5	35.2	35.4	34.5	35.3	35.1
75 min.	33.5	31.7	33.5	33.6	33.8	33.4	33.8
	0.5	3.8	1.7	1.8	0.7	1.9	1.3
Animal No. 5	39.6	38.9	38.2	38.8	38.1	38.9	38.4
48 min.	34.4	27.0	33.0	33.7	35.0	33.5	34.5
	5.2	11.9	5.2	5.1	3.1	5.4	8.9
Animal No. 6	38.1	37.5	37.6	37.8	37.4	37.3	37.1
43 min.	33.8	27.7	34.9	33.1	34.6	36.4	34.0
	4.3	9.8	3.7	4.7	2.8	4.9	3.1
Animal No. 7*	37.8	38.1	38.2	38.1	38.1	37.9	37.8
25 min.	34.1	30.3	34.6	34.5	36.0	33.9	35.1
	3.7	7.8	3.6	3.6	2.1	4.0	2.7
Animal No. 8	38.1	39.6	39.1	39.5	39.8	39.4	38.7
54 min.	31.6	25.4	32.3	32.8	35.8	32.5	33.8
	6.5	14.2	6.8	6.7	4.0	6.9	4.9
Animal No. 9	34.9	37.0	37.1	36.9	37.1	36.8	36.8
49 min.	29.9	24.2	31.4	31.2	34.0	31.0	32.8
	5.0	12.8	5.7	5.7	3.1	5.8	4.0
Animal No. 10	39.0	39.0	40.1	39.9	39.2	38.9	38.3
67 min.	34.1	25.7	34.1	33.9	36.9	32.8	33.8
	4.9	13.3	6.0	6.0	3.3	6.1	4.5
Animal No. 11	35.3	37.4	38.0	38.0	37.0	37.1	36.8
36 min.	31.1	27.6	33.5	33.5	34.1	32.6	33.3
	4.2	9.8	4.5	4.5	2.9	4.5	3.5
Animal No. 12	34.6	37.0	37.4	37.2	36.4	36.5	36.8
46 min.	29.6	25.7	31.6	31.5	33.5	30.6	33.1
	5.0	11.3	5.8	5.7	2.9	5.9	3.7
Average decrease	4.7	11.3	5.1	5.2	3.0	5.4	3.8

*Not averaged in.

TABLE 6—RABBITS

The Effect of Cold Applied to the Abdominal Wall Upon the Temperature in Various Parts of the Intraperitoneal Cavity

	Rectum	Beneath upper parietes	Beneath the diaphragm	Center of mass of intestines	Above lower parietes	Pelvis	Just inside peritoneal cavity
Animal No. 1							
Before	36.5	37.9	38.3	37.8	37.8	37.8	38.1
48 min. After	33.0	30.4	34.4	34.0	35.8	33.9	34.2
Decrease	3.5	7.5	3.9	3.8	2.0	3.9	3.9
Animal No. 2*	38.8	38.9	39.1	38.9	38.7	39.1	38.4
13 min.	37.6	35.8	37.7	37.3	37.7	37.4	37.2
	1.2	3.1	1.4	1.6	1.0	1.7	1.2

Animal No. 3	38.5	39.1	39.4	40.3	39.4	39.3	39.1
46 min.	34.3	32.2	35.5	36.4	35.9	35.4	35.4
	4.2	6.9	3.9	3.9	3.5	3.9	3.7
Animal No. 4	37.8	38.5	38.9	39.0	39.1	38.8	39.1
45 min.	33.1	30.4	34.8	35.0	36.7	34.7	35.7
	4.7	8.1	4.1	4.0	2.4	4.1	3.4
Animal No. 5	38.5	40.0	39.8	38.8	39.6	38.7	39.1
34 min.	35.1	33.6	36.8	35.9	38.0	35.7	37.2
	3.4	6.4	3.0	2.9	1.6	3.0	1.9
Animal No. 6	39.1	40.0	40.0	39.9	39.7	39.9	39.2
51 min.	35.5	32.3	36.4	36.5	36.9	36.3	36.5
	3.6	7.7	3.6	3.4	2.8	3.6	2.7
Average	3.9	7.3	3.7	3.6	2.5	3.7	3.2

*Not averaged in.

When the ice bag was applied for thirty minutes or longer the above results were obtained. The decrease in intraperitoneal temperature was greatest just beneath the upper parietes; it was least just above the lower parietes; and was intermediate in the mass of intestines in the center. Likewise the falls of temperature in the pelvis and against the diaphragm were less than that against the upper parietes.

TABLE 7

Time as a Factor in the Decrease in the Intraperitoneal Temperature

	Minutes, total decrease during											
	1	2	3	5	10	15	20	25	30	45	60	75
Guinea pig No. 1.	0.2	0.6	1.0	1.4	5.2	7.8	9.0	10.5	13.0	13.4		
Guinea pig No. 2.							19					
	0.4	1.8	3.0	3.6	7.0	8.0	9.0					
Guinea pig No. 3.			4			13	16	26				
	0.0	0.0	0.2	0.2	0.3	0.5	0.9	2.8	3.3	11.7	12.6	
Guinea pig No. 4.			3									
	1.2	1.8	2.6	3.4								
Same animal at a different time					11				31			
	0.1	0.1	0.2	0.5	0.5	1.2	1.9	2.1	2.3	2.9	3.5	3.9
Rabbit No. 1.						13	21	26	32	44	48	
	0.2	0.3	0.7	1.3	2.8	3.4	4.3	5.1	6.0	7.0	7.5	
Rabbit No. 2.				4	9	13						
	0.2	0.5	0.8	1.1	2.0	2.2						

Table 7 illustrates that the greatest decrease per unit of time of the intraperitoneal temperature occurs during the period between ten and forty-five minutes after the application of the cold.

TABLE 8—GUINEA PIGS

Effects of Shivering and Convulsions Upon Intraperitoneal Temperature

	Minutes, total change after cold applied								
	0	2	5	10	15	20*	25	30	34†
Guinea pig No. 1.	37.1	36.5	35.6	31.9	29.4	28.1	26.6	24.0	23.6
	35	36	38	39	40	44			
	24.3	24.9	25.3	25.5	25.6	26.2			

*Shivering began.
†Convulsions began; shivering continued.
Temperature decreased 13.5 degrees in 34 min.
Temperature then increased 2.6 degrees in 10 min.

Guinea pig	0	2	5*	0†	5	11	15	21
No. 2	39.4	37.6	36.0	35.5	35.5	35.1	34.4	33.6
	25	31	35	40	45	60	75	
	33.4	33.2	33.1	33.0	32.6	32.0	31.7	

*Shivering severely—ice removed—temperature had dropped 3.4 degrees in 5 min.
†Ice reapplied. Shivered severely—decrease now of 3.9 degrees in 75 min.

Shivering and (in one case) convulsions acted to prevent a rapid decrease, or to actually increase, the temperature. In one animal (guinea pig) in five minutes cold decreased the intraperitoneal temperature 3.4 C. (39.4 C. to 36.0 C.). Shivering then became constant and pronounced, and during a later period of seventy five minutes the temperature decreased 3.8 C. further (from 35.5 C. to 31.7 C.). In another animal in 34 minutes cold reduced the temperature 13.4 C. (37.0 C. to 23.6 C.); convulsions set in and in seven minutes the temperature had risen 2.6 C. (to 26.2 C.). See Table 8.

TABLE 9 ....

Intraperitoneal Temperature Changes After Removal of External Cold

	Temp. before cold applied	Cold applied (minutes)	Degrees of decrease	Lowest temp. value	Interval at room temp. (minutes)	Degrees of increase in temp.	Resulting temperature
Guinea pig No. 1.....	38.4	18	9.0	29.4	92	5.9	35.3
Guinea pig No. 2.....	35.5	105	3.8	31.7*	47	3.6	35.3
Rabbit No. 1.....	37.9	48	7.5	30.4	48	3.7	34.1

*Guinea pig was shivering most of time.

After removal of the ice bag the intraperitoneal temperature rose and gradually approached the normal. If the animal shivered the rise was much more rapid, and the normal temperature was more nearly approached. In one animal in eighteen minutes there was a temperature decrease of 9.0 C. (38.4 C. to 29.4 C.); in ninety-two minutes after removal of the cold the temperature rose 5.9 C. (29.4 C. to 35.3 C.). See Table 9.

EXPERIMENT THREE—EFFECT OF HEAT

A. Application of Local Heat.

In studying the effects of local heat the animal lay in the same position (i. e., on its left side), and hot water bags were employed. These applied temperatures did not exceed 50 degrees Centigrade.

TABLE 10—GUINEA PIGS.

The Effect of Heat Applied to the Abdominal Wall Upon the Temperature Values in the Intraperitoneal Cavity

	Rectum	Beneath upper parietes	Beneath diaphragm	Center of mass of intestines	Above lower parietes	Pelvis	Just inside peritoneal cavity
No. 1* After. 26 min.	38.2	43.3	39.5	39.9	39.0	39.3	38.6
before	38.1	39.6	39.1	39.5	38.9	39.4	38.7
Increase ...	0.1	3.7	0.4	0.4	0.1	—0.1	—0.1
No. 2	40.9	44.1	40.7	42.1	38.5	38.8	38.3
50 min. ...	39.0	39.0	40.1	39.9	39.2	39.7	38.3
	1.9	5.1	0.6	2.2	—0.7	—0.9	0.0
No. 3	34.1	38.3	37.2	38.2	36.7	35.9	36.4
40 min. ...	33.9	34.6	36.5	36.6	35.2	35.8	36.3
	0.2	3.7	0.7	1.6	1.5	0.1	0.1

No. 4	35.9	42.1	38.7	39.6	38.6	37.5	37.6
46 min. ...	35.0	37.9	37.8	37.8	37.2	37.6	37.5
	0.9	4.2	0.9	1.8	1.4	—0.1	0.1
No. 5	37.6	42.0	39.1	39.6	39.4	38.3	38.1
37 min. ...	37.5	38.6	38.8	38.7	38.9	38.4	38.2
	0.1	3.4	0.3	0.9	0.5	—0.1	—0.1
No. 6	39.9	44.4	40.1	41.6	41.7	39.1	39.1
52 min. ...	38.0	39.3	39.4	39.3	39.1	39.2	39.1
	1.9	5.1	0.7	2.3	2.6	—0.1	0.0
No. 7	39.2	45.1	40.0	41.8	41.8	38.9	38.8
56 min. ...	37.6	39.0	39.2	39.1	38.8	38.8	38.7
	1.6	6.1	0.8	2.7	3.0	0.1	0.1
No. 8	38.0	42.9	37.8	38.8	38.6	36.7	36.7
42 min ...	35.9	36.7	36.8	36.7	36.5	36.5	36.5
	2.1	6.2	1.0	2.1	2.1	0.2	0.2
No. 9	38.5	43.7	38.4	39.6	39.7	37.6	37.5
50 min. ...	36.1	37.4	37.4	37.4	37.3	37.3	37.3
	2.4	6.3	1.0	2.2	2.4	0.3	0.2
No. 10	38.1	43.5	38.9	39.7	39.5	38.4	38.2
39 min. ...	37.2	38.5	38.6	38.6	38.3	38.3	38.1
	0.9	5.0	0.3	1.1	1.2	0.1	0.1
No. 11	37.7	41.8	37.9	38.5	38.4	37.2	37.1
40 min. ...	36.8	37.3	37.5	37.5	37.1	37.3	37.2
	0.9	4.5	0.4	1.0	1.3	—01	—0.1
No. 12	37.8	41.9	39.3	39.6	39.7	36.6	36.9
35 min. ...	37.6	38.8	39.0	38.9	38.6	36.7	36.7
	0.2	3.1	0.3	0.7	1.1	—0.1	0.2
Average	1.2	4.8	0.6	1.7	1.5	—0.05	0.1

*Not included in average.

TABLE 11—RABBITS

The Effect of Heat Applied to the Abdominal Wall Upon the Temperature Values in the Intraperitoneal Cavity

	Rectum	Beneath upper parietes	Beneath diaphragm	Center of mass of intestines	Above lower parietes	Pelvis	Just inside peritoneal cavity
No. 1.* After 27 min.	36.2	43.2	37.0	38.3	36.2	36.4	35.9
before	35.9	35.8†	36.0	35.8	35.8	35.8	34.5
Increase ...	0.3	7.4	1.0	2.5	0.4	0.6	1.4
No. 2	36.0	41.0	35.2	37.1	36.9	37.2	37.1
65 min. ...	33.1	33.7†	34.1	34.1	33.5	34.0	33.6
	2.9	7.3	1.1	3.0	3.4	3.2	3.5
No. 3	39.8	45.0	40.1	41.2	39.9	40.1	38.7
35 min. ...	39.2	39.1	39.1	39.1	39.1	39.2	37.3
	0.6	5.9	1.0	2.1	0.8	0.9	1.4
No. 4	39.8	44.6	39.8	40.7	40.6	40.8	40.3
48 min. ...	37.7	38.4	38.6	38.4	38.4	38.5	38.0
	2.1	6.2	1.2	2.3	2.2	2.3	2.3
No. 5	40.1	43.7	39.4	40.5	40.6	40.9	40.5
45 min. ...	37.0	37.9	38.1	37.9	37.9	38.0	37.7
	3.1	5.8	1.3	2.6	2.7	2.9	2.8
No. 6	40.2	44.8	41.1	40.9	41.1	41.3	40.3
48 min. ...	38.1	39.3	39.5	39.2	39.2	39.3	38.1
	2.1	5.5	1.6	1.7	1.9	2.0	2.2
Average increase....	2.1	6.0	1.0	2.3	2.2	2.3	2.5

*Not included in average.
†Previously reduced by cold.

When heat was applied locally to the external abdominal wall by far the greatest rise in temperature occurred in the area just beneath the area of application of the heat. A very definite increase was also observed in the center of the mass of intestines and in the pelvis. These increases were proportionately greater in the rabbits than in the guinea pigs. (Table 10 and Table 11.)

TABLE 12.

Time as a Factor in the Increase in Intraperitoneal Temperatures as a Result of Hot Water Bottles Applied to the Abdominal Wall*

Total Increase in Minutes

	1	2	3	9	11	15	20	25				
Guinea pig No. 1	0	0.2	0.2	0.2	1.0	1.4	3.3	3.6				
	1	2	4	6	10	16	20	25	30			
Guinea pig No. 2	0	0.1	0.4	0.7	0.8	1.2	2.1	3.9	5.0			
	1	2	3	5	11	15	20	27				
Rabbit No. 1....	1.5	2.3	2.9	3.9	5.7	6.4	7.0	7.4				
	1	2	3	7	12	15	20	25	30	45	60	65
Rabbit No. 2....	0.8	1.4	1.8	2.8	3.2	3.7	4.2	4.2	4.2	6.5	7.1	7.2

*Beneath upper parietes.

When a hot water bottle was applied to the external parietes as hot as possible without causing distress (distress occurred at a temperature between fifty degrees Centigrade and fifty-two degrees Centigrade) it was usually found that the subjacent intraperitoneal temperature did not undergo change as quickly as when cold was applied. Fifteen or even twenty minutes were usually required to produce an appreciable change. The continued application of heat after thirty to forty-five minutes caused a more gradual increase in the subjacent temperature than had occurred during the previous period. See Table 12.

TABLE 13.

Intraperitoneal Temperature Changes After Removal of External Heat

	Temp. before heat applied	Heat applied (minutes)	Degrees incr. in temp.	Highest elevation of temp.	Interval at room temp.	Degrees decr. in temp.	Resulting temp.	Total time interval	Total decrease	Resulting temp.
Guinea pig No. 1...	39.6	25	3.7	43.3	20	4.2	39.1	120	6.7	36.6
Guinea pig No. 2...	39.0	30	5.1	44.1	8	3.8	40.3	14	5.7	38.4
Rabbit No. 1...	35.8	27	7.4	43.2	27	6.9	36.3	122	10.4	32.8
Rabbit No. 2...	33.7	65	7.3	41.0	19	3.5	37.5	115	8.7	32.3

When the external heat was removed the intraperi toneal temperature fell rapidly, especially at first. After the temperature approached normal, which ordinarily occurred in less time than the elevation had required, the rate of temperature decrease became less; and without fail the temperature became even lower than it originally had been. For instance, one animal (guinea pig) had an original temperature of 39.0; heat was applied for thirty minutes with an increase of 5.1 C. (to 44.1 C.); in eight minutes at room temperature (28.0 C.) the temperature decreased 3.8 C. (to 40.3 C.); in six additional minutes it made a further decline of but 1.9 C. (to 38.4 C.) (Table 13.)

TABLE 14

Comparison of the Effect of Heat in the Elevating of Intraperitoneal Temperatures from Subnormal Towards Normal and from Normal to Above Normal

	Normal temp.	Ice bag applied (min.)	Degrees dec.	Temp. resulting	Heat applied	Degrees inc.	Temp. resulting	Heat further applied (not total)	Degrees further increase	Temp. resulting
Rabbit No. 1	38.9	13	3.1	35.8	4.	3.3	39.1	11	3.1	42.2
Rabbit No. 2	37.9	48	7.5	30.4	54*	3.3	33.7	24	4.0	37.7
								45	3.1	40.8

*At room temperature—25C.

When the temperature of an animal was below normal, as occurred following the application of an ice bag, the applied heat required less time to elevate the temperature up to the normal than was then required to elevate the temperature a like amount above normal. Applied heat required less time to raise a depressed temperature than had previously been required by applied cold to lower the temperature any stated amount. One animal (rabbit) had a normal temperature of 38.9 C.; an ice bag was applied for thirteen minutes giving 3.1 C. decrease (to 35.8 C.). Then a hot water bottle was applied for four minutes, giving 3.3 C. increase in temperature (39.1 C.); during the eleven succeeding minutes, having been reheated as needed, it raised the temperature but 3.1 C. (to 42.2 C.) (Table 14.) In one instance in which an animal (rabbit) shivered considerable while under the applications of cold, and also after its removal while recovery was taking place at room temperature (28.0 C.), the shivering ceased almost immediately upon the application of a hot water bottle; and that result was noted before any appreciable rise of temperature had occurred intraperitoneally.

TABLE 15.

The Difference in External and Simultaneous Intraperitoneal (Beneath Upper Parietes) Temperatures During the Application of Cold

	Guinea Pig No. 1							
Internally	35.1	33.5	33.3	32.6	31.8			
Externally	19.4	24.2	23.6	17.0	18.5			
Difference	15.7	9.3	9.7	15.6	13.3			
	Rabbit No. 1							
Internally	37.9	36.2	35.3	34.9	34.2	32.6	31.7	30.4
Externally	20.8	21.7	23.6	25.1	24.1	21.4	16.5	17.3
Difference	17.1	14.5	11.7	9.8	10.1	11.2	15.2	13.1

TABLE 16

The Difference Between External and Simultaneous Subjacent Intraperitoneal Temperatures During the Application of Heat

	Total Time in Minutes					
	2	5				
Guinea pig No. 1—Ext.	49.2	50.8				
Int.	39.8	43.3				
Dif.	9.4	7.5				
	4	6	15	30	45	60
Guinea pig No. 2	40.5	43.0	42.6	49.5	47.5	47.7
	39.4	39.7	40.0	40.0	41.5	42.7
	1.1	3.3	2.6	9.5	6.0	5.0
	Total Time in Minutes					
	2	10	19			
Rabbit No. 1	52.0	51.5	52.0	47.5		
	37.3	40.2	40.8	41.0		
	14.7	11.3	11.2	6.5		

The difference between the temperature of the external skin beneath the ice bag and the temperature of the subjacent intraperitoneal location is greater than the difference when a hot water bottle is in use. Theoretically this is true because of the following facts: the average external temperature in that location was 38.0 C. for guinea pigs and 39.5 C. for rabbits. In man the accepted oral temperature is 37.0 C. The external temperature can not go above fifty degrees Centigrade (or fifty-two degrees Centigrade) without causing distress from burning. Hence in man this is a theoretical maximum difference of fifteen degrees Centigrade (fifty two degrees minus thirty-seven degrees). Likewise the external temperature in man can be depressed, theoretically, to approach the zero point, a maximum difference of thirty-seven degrees (thirty-seven degrees minus zero degrees). Actually in the animals the difference was not as great, having in these cases been found to vary from 9.3 C. to 17.1 C. with the ice bag. In the case of heat the difference in these temperatures was found to vary from 1.1 C. to 14.7 C. See Table 15 and Table 16.

B. Application of Diathermy.

Diathermy was administered by means of a standard clinical machine manufactured by the High Tension Co., (Type F302). The electrodes were commercial zinc-lead applied over compresses moistened in saturated saline solution. These were kept in position by elastic strips. The diathermy machine establishes a magnetic field which prohibits accurate thermo couple readings, both while the machine is in operation and shortly after the current is turned off. Thermometers must, therefore, be used to take internal temperatures in con-

TABLE 17.

Changes in the Intraperitoneal Temperature Produced by Diathermy with the Electrodes Applied About the Liver

	Minutes										
	0	3	5	8	13	18	25	30	35	40	45
Guinea pig No. 1—Rectum	35.0	35.0	35.2	35.7	35.6	35.6	35.0	34.3	34.8	34.8	34.8
Subdiaphragm	37.8	38.7	38.9	40.6	41.2	41.7	42.1	42.5	43.0	43.5	44.8
Pelvis	37.6	37.7	37.6	37.5	38.0	38.3	38.4	38.5	39.0	39.0	39.4
	0	2	5	10	15	20	25	30	35	40	45	52	57	62
Rabbit No. 1—Rectum	40.3	40.3	40.4	40.4	40.6	40.5	40.6	40.6	40.7	40.8	40.9	41.0	41.1	41.2
Subdiaphragm	40.6	40.6	40.6	40.6	40.7	40.8	40.9	41.0	41.2	41.3	41.6	41.9	42.1	42.3
Pelvis	40.5	40.5	40.5	40.4	40.6	40.7	40.8	40.8	41.0	41.1	41.4	41.6	41.8	41.9
	0	3	6	11	16	20	23	28	33	40	48
Rabbit No. 2—Rectum	38.3	38.3	38.3	38.4	38.2	38.3	38.3	38.3	38.4	38.4	38.4
Subdiaphragm	40.5	40.5	40.5	40.5	40.6	40.6	40.6	40.7	40.7	40.8	40.8
Pelvis	40.3	40.4	40.3	40.4	X	40.6	40.7	40.7	40.7	40.8	40.8

junction with diathermy. Although Sampson[1] says, "Twenty-five or thirty minutes (is) the average time for diathermy treatment," these tests were all run from forty-five minutes to several hours since the average abdominal operation requires more than thirty minutes' time. The electrodes were at times applied on opposite sides of the body at the level of the liver and diaphragm; in some instances, especially with the thermometer in the rectum, they were of the cuff variety and were applied to the hind legs. When the animals were under the influence of but small doses of sodium amythal they objected immediately and vigorously if the current was turned on strong enough to cause a burn. Abnormally rapid and deep respirations prevented marked elevations in temperature unless large doses of sodium amytal were used. The higher readings herein presented were obtained by this means.

1. C. M. Sampson; Practice of Physiotherapy; C. V. Mosby Co., St. Louis, Mo.; 1926, p. 123.

rise in subdiaphragmatic temperature; but in which after ten minutes the rectal temperature began to decline and this decline persisted to below the normal. The normal temperature was 35.0 C. In ten minutes the rectal temperature was 35.7 C. It then began to fall and in fifteen more minutes was 35.0 C. In five minutes more it sank to 34.3 C., and then rose to 34.8 C. where it persisted for ten minutes despite a steady rise in subdiaphragmatic temperature.

With the electrodes applied to the hind legs the temperature in the pelvis soon became slightly greater than that in the rectum, with the temperature in the subdiaphragmatic area markedly less. This was not always the case, as sometimes the rectal temperature was lower than the other two. But because of the decidedly lower *normal* rectal temperature the *increase* in degrees averaged more in the rectum. The temperature in the subdiaphragmatic area rose comparatively slowly. (Table 18.)

TABLE 18.

Changes Produced in the Intraperitoneal Temperatures by Diathermy, with the Electrodes Applied About the Hind Legs

Time in Minutes

	0	2	6	10	15	20	23	28	33	38	43	45
Guinea pig No. 1—Rectum	34.3	34.4	34.7	34.9	35.3	36.2	37.2	38.3	40.5	41.8	43.9	45.0
Subdiaphragm	37.8	37.8	37.7	37.8	38.1	38.4	38.7	38.9	39.2	39.3	39.3	39.3
Pelvis	37.8	37.8	38.0	38.7	39.1	39.8	40.6	41.3	42.4	43.3	44.0	44.5

	0	2	4	9	15	21	25	30	36	40	45	61	76	90	96
Rabbit No. 1—Rectum	37.7	37.7	37.7	37.8	37.9	37.9	37.9	38.2	38.5	38.5	38.9	39.1	39.3	39.3	39.4
Subdiaphragm	38.8	38.8	38.8	38.9	39.0	39.1	39.1	39.2	39.3	39.4	39.5	39.8	40.5	40.2	40.2
Pelvis	38.9	38.9	38.9	38.9	39.0	39.1	39.1	39.1	39.2	39.3	39.4	39.8	40.0	40.1	40.1

TABLE 19.

Time as a Factory in the Increase in Intraperitoneal Temperatures from Diathermy

Total Temperature Increase Shown by Minutes	Temp.	3	5	8	13	20	25	30	35	40	45
Guinea pig No. 1.* Rectum	35.0	0.0	0.3	0.7	0.6	0.6	0.0	—0.7	—0.2	—0.2	—0.2
Subdiaphragm	37.8	0.9	1.3	2.8	3.4	3.9	4.3	4.7	5.2	5.7	7.0
Pelvis	37.6	0.1	0.1	0.1	0.4	0.7	0.8	0.9	1.4	1.4	1.8

		2	5	8	13	20	25	30	35	40	45	68
Guinea pig No. 2.†—Rectum	34.3	0.1	0.4	0.6	1.0	1.8	2.9	4.0	6.2	7.5	9.6	10.7
Subdiaphragm	37.8	0.0	—0.1	0.0	0.3	0.5	0.9	1.1	1.4	1.5	1.5	1.5
Pelvis	37.8	0.0	0.2	0.9	1.3	2.0	2.8	3.5	4.6	5.5	6.2	6.7

		2	5	10	15	20	25	30	35	40	45	52	57	62
Rabbit No. 1.* Rectum	40.3	0.0	0.1	0.2	0.2	0.2	0.3	0.4	0.5	0.5	0.6	0.7	0.8	0.9
Subdiaphragm	40.6	0.0	0.0	..	0.1	0.2	0.4	0.4	0.6	0.7	1.0	1.3	1.5	1.7
Pelvis	40.5	0.0	0.0	—0.1	0.1	0.2	0.3	0.3	0.5	0.6	0.9	1.1	1.3	1.4

		3	6	11	16	20	23	28	33	40	44	48
Rabbit No. 2.*—Rectum	38.3	0.0	0.0	0.1	—0.1	0.0	0.0	0.0	0.1	0.1	0.1—	0.1—
Subdiaphragm	40.5	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3
Pelvis	40.3	0.1	0.0	0.1	0.2	0.3	0.4	0.4	0.4	0.5	0.5	0.5

		3	4	9	15	20	25	30	36	40	45	61	76	90	96
Rabbit No. 3.†—Rectum	37.7	..	0.0	0.1	0.2	0.2	0.2	0.2	0.5	0.8	0.8	1.8	1.4	1.6	1.7
Subdiaphragm	38.8	0.0	0.0	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.7	1.0	1.7	1.4	1.4
Pelvis	38.9	—0.1	—0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.4	0.5	0.9	1.1	1.2	1.2

*Electrodes about liver.
†Electrodes about hind legs.

With the electrodes applied in the region of the liver and diaphragm by far the greatest increase in temperature was in the subdiaphragmatic area. (Table 17.) Table 17 also shows the rectal temperature of one animal (guinea pig) which had from the first a marked

The continued application of diathermy with a fairly large current produced a gradual rise in intraperitoneal temperature. In other regions the rise was not as great; or there was a slightly decrease in the regions through which the current did not pass. If the current was

low or moderate the body dissipated the heat and the highest temperature change was not marked. Especially is this true in the rabbit, and unless heavily narcotized and covered with a towel its respirations were sufficiently frequent and deep to prevent a very rapid or extensive rise in temperature. And this despite the fact that the animal may be so heavily narcotized as to be immune to pain. The rise in temperature from diathermy required more time to appear than that induced by a hot water bottle. (Compare Table 12 and Table 19.) Twenty to thirty minutes were usually required to produce an appreciable change with the diathermy. (Table 19.) The time required to warm up the saline moistened compresses undoubtedly accounts for part of the delay. Unless the rabbit was very heavily narcotized and covered with a towel the rise in temperature was very slight ranging from 0.1 C. to 1.8 C. in forty-five minutes. In some instances, however, with the electrodes applied about the diaphragmatic area the rectal temperature during the same period of time sank below the original temperature. (Table 19.)

Removal of the diathermy electrodes from about the liver was followed by a prompt and definite decrease in the temperature beneath the diaphragm, and by a small but constant and definite increase in the temperature of both rectum and pelvis. (Table 20.)

The discontinuance of the diathermy current applied to the hind legs caused a constant increase in the rectal and pelvic temperatures, and a smaller increase in the subdiaphragmatic temperature at times. (Table 21.)

The above phenomenon is undoubtedly due, in whole or in part, to a redistribution of the blood of the body from the areas in the diaphragmatic field. With the discontinuance of the diathermy the current of blood which has been flowing rapidly through this region is free to return to other areas, presumably less hyperemic, and the increase in temperature results. That the skin, muscle, and solid viscera are especially concerned in the changes during diathermy application we can understand from the following statement by Sampson,[3] "The heat found in a given part from the passage of a given amount of current though it varies as its

TABLE 20.

Changes Occurring in Intraperitoneal Temperatures When Diathermy Electrodes Are Removed from About the Diaphragmatic Region

	Normal Temp.	Diathermy applied (min.)	Deg. increase	Resulting Temp.	Minutes After Diathermy Off												
					1	2	3	5	7	9	10	12	15	20	25	Elevation	
Guinea pig No. 1—																	
Rectum	35.0	45	—0.2	34.8	34.8	34.8	34.8	34.8	34.9	34.8	34.9	34.9	34.9	35.1	35.1	0.3	
Subdiaph.	37.8	45	7.0	44.8	44.5	44.3	44.0	43.5	43.2	42.5	42.3	41.7	41.2	40.5	40.1	0.0	
Pelvis	37.6	45	1.8	39.4	39.5	39.5	39.5	39.5	39.7	39.7	39.8	39.7	39.7	39.6	39.5	0.4	
					1	2	3	5	7	9	11	12	16	20	24	28	72 Elevation
Rabbit No. 1—																	
Rectum	40.3	62	0.9	41.2	41.2	41.2	41.2	41.3	41.3	41.3	41.3	41.3	41.4	41.4	41.5	41.5	41.8 0.6
Subdiaph.	40.6	62	1.7	42.2	42.3	42.3	42.3	42.4	42.5	42.5	42.5	42.6	42.7	42.7	42.7	42.8	42.0 0.5
Pelvis	40.5	62	1.4	41.9	41.9	41.9	41.9	42.0	42.0	42.0	42.0	42.0	42.2	42.2	42.4	42.4	42.6 0.7
					1	2	4	6	7	9	10	12	15	20	25	29	Elevation
Rabbit No. 2—																	
Rectum	38.3	48	0.1	38.4	38.4	38.4	38.4	38.4	38.4	38.5	39.5	38.5	38.6	38.6	38.7	38.7	0.3
Subdiaph.	40.5	48	0.3	40.8	40.8	40.9	40.8	40.8	40.8	40.8	40.8	40.8	40.8	40.8	40.8	40.8	0.1
Pelvis	40.3	48	0.5	40.8	40.8	40.9	40.9	40.8	40.8	40.8	40.8	40.9	40.9	40.9	40.9	40.9	0.1

TABLE 21

Changes Occurring in Intraperitoneal Temperatures When Diathermy Electrodes Are Removed from the Hind Legs

	Normal Temp.	Diathermy applied (min.)	Deg. increase	Resulting Temp.	Minutes After Diathermy Off												
					1	2	3	5	7								
Guinea pig No. 1—																	
Rectum	34.3	45	10.7	45.0	45.2	45.3	45.4	45.0	44.6								
Subdiaph.	37.8	45	1.5	39.3	39.3	39.3	39.3	39.3	39.3								
Pelvis	37.8	45	6.7	44.5	44.5	44.7	44.7	44.6	44.6								
					1	2	3	4	6	10	15	19	23	28	33	37	Elevation
Rabbit No. 1—																	
Rectum	37.7	96	1.7	39.4	39.4	39.4	39.4	39.4	39.4	39.4	39.4	39.2	38.5	38.5	38.2	38.1	0.0
Subdiaph.	38.8	96	1.4	40.2	40.3	40.3	40.3	40.3	40.4	40.4	40.5	40.5	40.6	40.6	40.6	40.7	0.7
Pelvis	38.9	96	1.2	40.1	40.1	40.2	40.2	40.3	40.4	40.4	40.5	40.5	40.6	40.6	40.7	40.7	0.7

resistance, that is . . . through tissues of varying degrees of resistance, then the more resistant tissues will generate the most heat."

2. C. M. Sampson; Practice of Physiotherapy, p. 140.

Viscera were brought outside the peritoneal cavity through a midline abdominal incision. Viscera exposed on the outside of the abdominal cavity showed a definite decrease in temperature in a limited time compared to a very nominal decrease in temperature in a limited time just inside the peritoneal cavity. If only small masses of intestine were brought out the temperature in the external mass would decrease five to eight degrees in thirty minutes. This may be partially due to a constriction of the circulation following evisceration through a small incision. If larger masses were exposed the temperature of the external mass approached very nearly (in time equalled) the temperature of the inside of the peritoneal cavity. This decline of the internal temperature was about 2.0 C. below the beginning temperature in one to one and one-half hours. If further exposure continued over a prolonged period there was a gradual decline in both visceral temperatures; in which the decline of the external temperature became the faster. (Table 22.)

When abdominal viscera had been exposed for considerable periods of time decreases in the temperatures of the exposed viscera and of various intraperioneal

EXPERIMENT FOUR-EXPOSURES OF VISCERA

TABLE 22.

Comparison of the Temperature of the Intestines Remaining Just Inside the Peritoneal Cavity and Those Brought Outside the Peritoneal Cavity and Exposed.

Time in Minutes.

	0	2	5	12	15	20	25	28	60	202
Guinea pig No. 1—Inside	35.7	35.4	35.2	35.1	35.2	35.3	35.7	35.8	35.6	35.0
Outside	35.7	29.6	28.7	28.1	28.0	28.2	28.4	28.5	29.5	31.5

	0	2	5	10	15	19	25	30	41	45	74
Guinea pig No. 2—Inside	36.8	36.8	36.7	36.7	36.8	36.8	36.8	36.8	*	36.3	35.0
Outside	36.8	31.8	31.3	31.0	30.9	30.9	31.0	31.7	*	35.6	35.0

*More intestines out.

	0	2	5	7	15	22
Guinea pig No. 3—Inside	37.5	37.3	37.2	37.2	36.8	36.6
Outside	35.4	34.9	34.6	34.5	33.9	33.2

	0	2	5	10	15	20	25	30	53
Guinea pig No. 4—Inside	38.8	37.4	37.2	37.2	37.3	37.5	37.7	37.5	37.3
Outside	38.8	35.8	34.0	32.2	31.5	31.0	30.5	30.8	31.0

	0	148	303
Rabbit No. 1—Inside	37.8	33.4	30.4
Outside	37.8	28.1	26.4

	0	3	30	60	90	125
Rabbit No. 2—Inside	40.0	40.1	40.1	40.0	40.0	39.8
Outside	38.8	38.9	38.2	28.0	27.9	27.1

TABLE 23.

Comparison of the Temperature of Various Intraperitoneal Regions After Exposure of Abdominal Viscera Outside the Peritoneal Cavity

	Rectum	Above lower parietes	Beneath upper parietes	Center of mass of intestines	Pelvis	Beneath the diaphragm	Just inside peritoneal cavity	Mass of exposed viscera	Surface of exposed viscera	Air
Guinea pig No. 1	36.1	37.6	37.4	37.9	37.1	38.0	36.8	31.8	28.9	27.4
86 minutes after	33.9	36.6	37.0	36.6	36.5	36.3	36.3	34.8	32.2	32.2
Decrease	2.2	0.6	0.4	1.3	0.6	1.7	0.5	—3.0	—3.3	...
Guinea pig No. 2	34.2	36.9	37.4	37.0	37.3	37.3	36.8	31.4	26.9	25.4
568 minutes after	32.9	34.9	35.1	34.7	34.9	34.5	34.5	33.1	27.3	25.6
Decrease	1.3	2.0	2.3	2.3	2.4	2.8	2.3	—1.7	—0.4	...
Rabbit No. 1	38.9	39.6	40.0	39.9	39.9	39.8	39.5	39.3	31.8	28.8
81 minutes after	38.8	39.1	39.6	38.8	39.4	38.9	38.2	38.1	33.9	29.8
Decrease	0.1	0.5	0.4	1.1	0.5	0.9	1.3	1.2	—2.1	...
Rabbit No. 2	37.8	38.9	39.1	39.1	39.1	39.1	37.8	33.0	29.7	28.6
317 minutes after	30.9	32.3	32.8	33.8	32.2	31.0	30.6	26.4	25.1	24.4
Decrease	6.9	6.6	6.3	5.3	6.9	8.1	7.2	6.6	4.6	...

TABLE 24.

The Temperature Changes Occurring with Careful Handling of the Viscera Remaining Within the Abdominal Cavity

	Time in Minutes												
	0	2	5	9	15	20	25	30	35	45	60	90	130
Guinea pig No. 1	36.6	36.4	36.4	36.6	36.6	36.6	36.6	36.6	36.6	36.5	36.4	36.3	36.2
				10					37				
Guinea pig No. 2	37.9	37.3	37.0	37.1	37.2	37.2	37.0	36.5	36.6				
				10					35				
Guinea pig No. 3	39.0	38.4	38.0	38.0	37.9	37.8	37.7	37.7	37.6				
				10									
Guinea pig No. 4	39.0	38.7	38.6	38.5	38.5	38.4	38.0	37.8	37.7				
				10						45	60	88	
Rabbit No. 1	37.5	37.5—	37.5—	37.5	37.5—	37.4	37.4	37.4	37.4—	37.3	37.2—	37.0	
			7										
Rabbit No. 2	39.1	38.9	38.9										
					17								
Rabbit No. 3	39.6	39.4	39.1	39.2	39.2								
					13	18							
Rabbit No. 4	39.0	38.7	38.9	39.0	39.1	39.3							
Rabbit No. 5	39.8	39.8	39.8	39.9	39.9	40.0	40.0						
					15	20	25						

regions occurred. These varied fairly constantly according to the position. The least change usually occurred beneath the upper parietes, usually less than 0.1 C. in an hour or more of exposure. The change above the lower parietes was about the same, the amount of change being influenced somewhat by the temperature of the table upon which the animal was placed. The change just inside the abdominal incision was also small, with the temperature values both before and after the exposure lower than those for the rest of the intraperitoneal cavity. The change in the pelvis was usually slightly greater than that beneath the upper parietes. The amount of change in the rectal temperature was the most variable, and depended largely upon the difference between the rectal and the general body cavity temperature values which were present at the beginning. The greatest decrease in temperature was usually beneath the diaphragm. The change in the mass of intestines remaining in the abdomen was next greatest. The exposed viscera usually had a later elevation in temperature unless very unfavorable conditions intervened, such as interferences with the circulation, or undue duration of exposures. (Table 23.)

When the different viscera were still retained within the abdominal cavity and were handled carefully a change in temperature was absent or not very marked. A decrease of one or two degrees Centigrade in thirty minutes was usually noted.

TABLE 25.

Temperature Changes Occurring with Handling and with No Handling of the Exposed Viscera

	Time in Minutes				
	0	5	12	15	18
Guinea pig No. 1—					
Not handled	28.1	27.8	27.9	28.2	28.5
			10		20
Handled*	32.5	32.4	32.1	32.9	33.0
	0	5	11	15	20
Guinea pig No. 2—					
Not handled	31.0	31.2	30.9	31.0	†31.2
	30	43	59	75	
	35.6	35.4	35.0	34.8	
	0	7	Ø2		
Guinea pig No. 3—					
Handled	35.4	34.5	33.2		
	0	5	8	16	
Rabbit No. 1—					
Not handled	37.8	37.5	37.3	37.1	
		2	5	15	
Handled	37.1	35.1	37.2	37.3	

*Previously warmed by towels.
†Abdomen still further opened.

Handling, gently or roughly, of the exposed viscera for some time caused an immediate drop in temperature of 0.4 C. to 3.0 C., followed by a rise to a temperature from 0.1 C. to 2.0 C. higher than before the handling. The decrease was undoubtedly due to more rapid evaporation with more exposure to the atmosphere. The succeeding increase was very likely due to an increased blood supply stimulated by the trauma. (Table 25.)

TABLE 26.

Comparison of the Temperatures of the Exposed Intestine and Its Exposed Mesentery

	Time in Minutes				
	0	5	21	87	95
Guinea pig No. 1—					
Surface of intestine	30.5	31.1	28.9	27.0	24.9
Surface of mesentery	33.5	32.8	30.0	28.9	27.0
Center of mass of exposed intestines	35.3	34.6	33.2	31.3	28.2
	0	4	9		
Guinea pig No. 2—					
Surface of intestine	25.0	25.5	25.8		
Surface of mesentery	27.1	29.0	28.3		
Center of mass of exposed intestines	30.4	32.7	31.5		
	0	9	21		
Rabbit No. 1—					
Surface of intestine	32.5	34.4	31.9		
Surface of mesentery	35.0	35.7	32.1		
Center of mass of exposed intestines	39.0	38.9	39.8		

When the intestinal surface was yet moist from the intraperitoneal secretions its temperature approached that of its own mesentery. At the same time the tem-

perature in the mass of exposed intestines was usually one or two degrees Centigrade warmer. Simultaneous exposure of moist and dry surfaces of the exposed gut showed the moist surface to average about 2.0 C. warmer. The dry surface on the exposed gut was found to be cooler than the simultaneous temperature of its own exposed mesentery. The difference was usually 1.5 C. to 2.5 C., but varied as much as 3.5 C. The temperature in the center of the mass of intestines outside the cavity was 2.5 C. to 4.0 C. (or more) greater than that of the exposed mesentery; and 3.5 C. to 6.0 C. (and sometimes more) greater than that of the exposed gut. Likewise it was usually greater than the temperature in the rectum when taken at the same time.

The temperature of the surrounding atmosphere exerts a certain influence upon the external or surface temperature of the exposed intestine. This surface temperature tends to become the same as that of the surrounding air if the temperature in the mass of exposed intestines is not too much higher or lower. If a considerable mass of intestines is exposed the temperature of the external mass approaches that of the normal body temperature. Hence if the temperature of the air is within two or three (or sometimes four or five) degrees Centigrade of the animal's body temperature the intestinal surface temperature will be that of the air. When the difference is greater the surface temperature tends to parallel the temperature in the mass of exposed intestines. (Table 27.)

TABLE 27.

The Effect of the Temperature of the Surrounding Air Upon the Temperature of the Exposed Viscera

	Time in Minutes											
	0	5	10	45	60	75						
Guinea pig No. 1—Atmosphere	28.2	28.3	28.3	28.8	32.2	32.2						
Surface of intestines	28.7	28.8	28.8	30.2	30.7	32.2						
Center of intestines	31.8	31.0	30.9	35.3	35.1	34.8						
	0	10	20	30	33	54	62	79	82	179	187	267
Guinea pig No. 2—Atmosphere	27.2	25.1	26.3	27.9*	29.1	26.8	25.6	26.5	28.0*	24.8	25.6	25.6
Surface of intestines	26.1	26.2	25.6	27.9	26.6		25.5	26.5		25.0	25.8	27.3†
Center of intestines	28.1	27.9	28.5	30.0	30.3	34.0	35.6	31.8	33.9		31.5	33.1
	0	5	20	85	95							
Guinea pig No. 3—Atmosphere	29.2	28.2	28.9	26.8	25.7							
Surface of intestines	30.5	31.5	28.9	27.0	24.9‡							
Center of intestines	35.3		33.2	31.3	28.2							
	0	10	21	135								
Rabbit No. 1—Atmosphere	28.8	29.8	25.4	24.4								
Surface of intestines	37.8	34.4	29.1	25.7								
Center of intestines	39.3	38.9	38.8	37.2								
	0		46	153								
Rabbit No. 2—Atmosphere				24.4								
Surface of intestines	28.9		27.3	25.1								
Center of intestines			30.5	26.4								

*Lamp (heat) brought closer.

†Intestines were just handled.

‡Intestines just handled very roughly.

‡Note the fall in temperature in this animal after very rough handling compared to the rise in temperature in the previous animal after gentle handling.

TABLE 28.

The Effect of Hot Wet Towels Placed Over the Exposed Viscera

	Time in Minutes Before (—) and After Towels Applied										
	—8	0*	3	5	10†	15	20	25	30	35	
Guinea pig No. 1—Towel on surface	32.2	43.0	40.0	35.0	40.0	45.0	40.0	35.5	33.0	37.5	
Center mass of intestines outside	34.8	34.9	35.3	35.3	35.8	35.6	35.8	35.5	35.0	35.1	
Center mass of intestines inside	35.3	35.3	35.4	35.5	35.7	35.7	35.8	35.7	35.5	35.5	
	—13	0*	2	5	10†	16	20				
Guinea pig No. 2—Towel on surface	25.8	35.6	32.6	26.5	34.1	32.9	33.2				
Center mass of intestines outside	31.5					33.3	33.7				
Center mass of intestines inside	36.2		36.4	34.7	33.6	35.4					
	—2	0*	3	9	10	16	21†	25†	30	35	40†
Rabbit No. 1—Towel on surface	30.2	38.1	35.3	36.4	36.3	35.8	38.1	39.9	37.9	36.4	38.5
Center mass of intestines outside	38.5	38.5	38.5	38.7	38.8	39.1	39.0	39.5	39.5	39.2	38.8
Center mass of intestines inside	39.8	39.7	39.8	39.8	39.8	39.8	39.9	39.9	39.9	39.9	39.9

*Hot towels applied.

†Hot towels reapplied.

Hot wet towels at temperatures not to exceed 45.0 C. kept the intestinal surface practically up to the temperature of the mass of exposed intestines. The temperature of the mass of exposed intestines could be raised small amounts, as 0.8 C. to 1.2 C., in ten to twenty minutes. The temperature of the mass of intestines remaining outside the peritoneal cavity was usually not raised over 0.2 C., but might go up to 0.5 C. or 0.8 C. if a large mass of intestines were exposed outside the cavity. The surface temperature changed quickly as the towels cooled and were reheated and reapplied; the temperature of the external mass lagged through a set of somewhat similar changes. But the viscera inside had a gradual temperature increase, followed by a gradual temperature decline. (Table 28.)

Cool wet towels at temperatures not below 25.0 C. lowered the intestinal surface temperature of the exposed viscera to which they were applied. The actual temperature varied with the temperature of the towel and the length of time during which it had been applied. The usual surface temperature change was an immediate temperature decline, followed by a rise as the heat of the viscera warmed up the towel. After this acme had been reached there was a gradual decline as the moist towel cooled from evaporation and cooled the intestinal surface with it. If the towel became dry the visceral heat then would raise the temperature again. The temperature in the center of the mass of external viscera was usually cooled down from 1.0 C. to 2.5 C. in thirty minutes. The temperature of the mass of intestines yet remaining inside cooled 0.5 to 1.0 C. in this same time. (Table 29.)

Cool towels applied to exposed viscera caused a very erratic curve of the intestinal surface temperature values. This was usually introduced by an instantaneous sharp drop followed by a slower recovery, extend-

TABLE 29.

The Effect of Cool Wet Towels Placed Over the Exposed Viscera

	Time in Minutes Before and After Towels Applied						
	--2	0*	2	5	10	14	19	25
Guinea pig No. 1—Towel on surface	29.5	30.0	30.0	29.7	29.1	28.9	28.3
Center mass of intestines outside	35.1	35.2	35.1	34.8	34.4	34.1	34.1	33.8
Center mass of intestines inside	35.5	35.5	35.5	35.3	35.1	35.0	34.8	34.6
	—1	0*	2	5	10	15	20†	25
Guinea pig No. 2—Towel on surface	33.2	25.0	33.2	26.0	26.3	27.4	33.0	29.4
Center mass of intestines outside	33.7	33.7	33.5	33.2	34.3	32.7	32.5	33.5
Center mass of intestines inside	35.4	35.4	35.4	35.2	34.9	35.1	35.1	35.1
	—1	0*	2	5	10	15‡	20	25
Rabbit No. 1—Towel on surface	34.4	26.3	28.0	28.1	28.2	30.0	30.1	30.2
Center mass of intestines outside	38.9	39.0	38.8	38.8	38.8	38.8	38.5	38.3
Center mass of intestines inside	40.1	40.1	40.1	40.1	40.0	39.9	39.8	39.8
	—1	0*	2	5	10	15		
Rabbit No. 2—Towel on surface	33.1	32.0	31.0	30.0	29.5	31.5		
Center mass of intestines outside	37.8	37.2	37.1	37.3	35.1	33.1		
Center mass of intestines inside	39.9	39.9	39.9	39.8	39.8	39.7		

*Cool towel applied.
†Towels removed.
‡Cool towels reapplied.

TABLE 30.

Alternating Temperature Changes After Application of Cool Towels to Exposed Viscera

Time in Minutes After Towel Applied

	0	1	2	5	6	7	10	13	15
Rabbit No. 1—Towel on surface	26.3	...	...	28.1	28.0	28.2	28.2	29.1	30.0
Center mass of intestines outside	39.0	38.9	38.8	38.8	38.9*	38.9	38.8*	38.8	38.8
Center mass of intestines inside	40.1	...	...	40.0	40.0	40.0	40.0	39.9	39.9
	0	1*	2*	5*	10*	15	20	25	30
Rabbit No. 2—Towel on surface	30.0	26.4	30.3	29.6	29.7	29.8	30.0	30.1	30.2
Center mass of intestines outside	38.8		38.8			...	...	38.5	38.4
	0	2	2½	3	4	4½	5½		
Rabbit No. 3—Towel on surface	34.2	26.0	...	...	...	...	...		
Center mass of intestines outside	37.5		36.7	36.8	36.4	36.2	36.0		

	0	1	2	3	4	5	5¼	5½	5¾	6	6½	6¾	8	10
Rabbit No. 4—Towel on surface	33.1	32.0	...	...	...	...	.	...	...	...	...	...	...	...
	37.3	37.2*	37.1	37.1½*	37.1*	37.1½*	37.2	37.2½	37.2*	37.2½*	37.3	37.2*	37.1—	37.1*
Center mass of intestines outside	37.3	37.2*	37.1	37.1½*	37.1*									

*Note change of direction of temperature from higher to lower then higher, and vice versa.

ing over the succeeding period of fifteen to twenty minutes as shown in Table 29.

The cool towels applied to the exposed viscera in addition to the gross changes in surface temperature of the exposed viscera as just previously shown also caused simultaneously fluctuating curves in the values not only of the surface temperatures beneath the towels but also in the temperatures in the center of the mass of intestine outside of the peritoneal cavity. These consisted of two to as many as eight direction fluctuations, each ranging in value from 0.1 C. (0.05 C.) to 0.4 C. The changes were somewhat difficult to decipher because of their small amplitude and short duration. The probable explanation is that they were produced by vascular spasms which were induced by the coolness of the towels; the minute decreases in temperature following a spasm being superseded by an increase in temperature as the spasm was temporarily released allowing the freer influx of arterial blood. (Table 30.)

CLINICAL OBSERVATIONS

A. In the Operating Room.

In taking temperature determinations at the operating table we confirmed the findings previously obtained with the animals in so far as our limited time allowed. This is a field which should yield fruitful results to further observations.

Chart A.

Hernia and Hydrocele Operation

		Temperature C.
8:35	Skin incision	
8:43	Subcutaneous tissue	33.2 C.
8:43	Exposed testicle	30.9 C.
8:44	Testicle replaced into scrotum	
8:48	Subcutaneous tissue	32.4 C.
8:58	Testicle withdrawn for temperature determination	35.4 C.

In one instance in doing a combined inguinal hernia and hydrocele operation the temperature of the surface of the testicle rose towards normal 4.5 C. in fifteen minutes after it had been replaced within the scrotum. The decreased temperature had resulted following the incision, exposure, and removal into operating room atmospheric temperature. (Chart A.)

Chart B.

Intestinal Resection

8:25	120 mg. novacaine.	
8:30	Incision through left rectus muscle.	
8:36	Omentum	36.0 C.
8:37	Parietal peritoneum	37.7 C.
8:38	Jejunum, inside abdomen, but exposed	36.7 C.
8:38 to 9:22	Removal of left one-half of transverse colon and part of descending colon.	
9:22	Parietal peritoneum, well posteriorly	36.1 C.
9:23	Omentum	35.4 C.
9:23	Stomach	36.1 C.
9:24	Jejunum, of left upper quadrant, not previously exposed	36.9 C.

In this case in which temperatures were taken during an operation for intestinal resection it was noted that, as usual, those intestines well away from the incision and not exposed had the highest temperature value. (Chart B.)

Chart C.

Cholecystectomy.

8:33	Air	36.2 C.
8:34	Omentum, surface of	34.4 C.
8:35	Subcutaneous fat in wall of wound	34.6 C.
8:35	Under surface of liver	36.3 C.
8:49	Upper surface of liver after cholecystectomy	37.8 C.
8:55	Exposed liver surface	37.0 C.
9:09	Subcutaneous fat, as above	35.6 C.
9:22	Skin after operation	34.0 C.

In an instance in which operation was performed for cholecystitis the determinations read by a student nurse seemed to indicate a rise of temperature in the space between the liver and the diaphragm of 1.7 C. in the fifteen minutes elapsing during the removal of the gall-bladder. The operating light was focused in the wound during this time, as usual. In another cholecystectomy (shown in Chart C) there seemed to be a higher temperature in the region between the liver and the diaphragm than in the other tissues examined.

Chart D.

Appendectomy.

11:04	Atmosphere above operating table	30.2 C.
11:04	Subcutaneous tissue	34.1 C.
11:06	Cecum, having been exposed for two minutes	32.9 C.
11:12	Skin	34.7 C.
11:33	Parietal peritoneum, unexposed	37.7 C.
11:42	Subcutaneous tissues	34.4 C.
11:51	Skin near wound	34.4 C.
11:52	Cheek	32.4 C.
11:53	Left clavicular region	32.6 C.
11:56	Dorsum of right foot	32.2 C.
11:57	Chest, midline	33.3 C.

In an operation for appendicitis under general anesthesia, with the surrounding air definitely cooler than the body temperature, it was noted that the temperature of the exposed cecum sank definitely and rapidly below the temperature of the incised tissues of the wound's edges; and these in turn were much cooler than the parietal peritoneum which had been unexposed. (Chart D.) Although these temperatures are lower than the average body temperatures (37.0 C.) they are yet higher than other body surface temperatures of this patient. (Chart D.)

Chart E.

Prostatectomy.

8:34	Subcutaneous fat of abdominal wall	36.0 C.
8:36	Surface of bladder	37.5 C.
8:42	Bladder mucosa	38.3 C.
8:42 to 9:01	Removal of Prostate.	
9:01	Bladder mucosa	35.2 C.
9:13	Subcutaneous fat	33.3 C.

In a one-stage suprapubic operation for removal of the prostate it was noted that the internal bladder temperature (mucous membrane) decreased 2.3 C. during nineteen minutes, the prostate having been removed during that interval. (Chart E.)

B. On the Wards.

Decreases in the intraperitoneal temperatures of two patients on the wards following the application of ice bags to the abdomen were studied.

Chart F.

Ascites from Hepatic Cirrhosis

Temperature reduction beneath parietes of left lower quadrant of a male, age fifty-four years, with abdominal ascites (hepatic cirrhosis).

Time Elapsed in Minutes

0	2	3	5	10	14	19	25	30	34
37.7	37.3	37.1	36.6	35.0	34.1	34.2	34.0	33.9	33.5

The first patient was a male, aged fifty-four years, with marked abdominal ascites from hepatic cirrhosis. Following one of the paracentesis procedures (through the midline below the umbilicus) a special terminal constructed partly out of a catheter (No. 12 French) was inserted through the cannula and directed toward the left lower quadrant. An ordinary ice bag with cover was applied. The intraperitoneal beneath the abdominal parietes was reduced 4.2 C. (37.7 C. minus 33.5 C.), or 7.6 Fahrenheit. in thirty-four minutes. (Chart F.)

Chart G.

Ascites from Cardiac Decompensation.

Temperature reduction beneath parietes of right lower quadrant in a female, age forty-eight years, with abdominal ascites (cardiac decompensation).

Time Elapsed in Minutes

0	2	3	5	10	15	19	25	29	34	40	46
38.2	37.8	37.8	37.3	36.5	34.8	33.7	31.7	30.8	30.3	29.6	29.4

The second patient was a female, aged forty-eight years, with marked abdominal ascites following cardiac decompensation. Here also following one of the paracentesis procedures the special terminal was inserted and directed toward the right lower quadrant. The intraperitoneal temperature beneath the parietes was reduced 8.8 C. (38.2 C. minus 29.4 C.), or 15.7 degrees Fahrenheit, in forty-six minutes. (Chart G.)

SUMMARY

1. The normal intraperitoneal temperature of guinea pigs and rabbits varied for the individual and varied in the individual in different locations. For the different individuals the comparative temperature changes were rather similar.

2. Cold, applied for thirty minutes or more by means of an ice bag, lowered the subjacent intraperitoneal temperature an average of 11.3 C. in twelve guinea pigs; lowered the temperature an average of 7.2 C. in six rabbits; and lowered the temperature 4.2 C. and 8.7 C. respectively in the two human subjects.

3. Shivering of the animal tended greatly to reduce the rate of decrease of the temperature. The temperature actually increased 2.4 C. in one case in which convulsions also intervened.

4. Heat, approximately 50.0 C., applied for thirty minutes or more, by means of a hot water bottle, raised the subjacent intraperitoneal temperature an average of 4.8 C. in twelve guinea pigs; and raised the temperature an average of 6.0 C. in six rabbits.

5. Cold caused a greater decrease in intraperitoneal temperature below normal than heat did above normal. Cold also produced its change in less time. After a latent period of variable length both cold and heat had a period of maximum change per unit of time, followed by a much smaller change per unit of time. The maximum difference in temperature between the external and internal surface is theoretically 37.0 C. in the application of cold; and theoretically 13.0 C. (or 15.0 C.) in the application of heat. Actually the difference was not this great.

6. When the external cold was removed the intraperitoneal temperature slowly approached toward normal. When the external heat was removed the temperature rapidly fell toward normal, and then more slowly sank below normal.

7. When the intraperitoneal temperature was below normal the application of heat raised the temperature to normal in much less time than was then required to elevate the temperature the same number of degrees above normal.

8. When the diathermy was applied through the diaphragmatic areas by far the greatest increase in temperature was in the sub-diaphragmatic regions. In the pelvis and rectum, especially the latter, the change was very slight.

9. With the diathermy applied to the hind legs the major temperature rise was in the pelvis and rectum. In the rabbits with a rapid respiratory rate the subdiaphragmatic temperature rise was about as great as there; in other animals the subdiaphragmatic rise was not nearly as great.

10. The discontinuance of diathermy when applied about the liver was followed by a slow but constant increase in temperature in the pelvis and rectum for twelve to twenty-five minutes. When diathermy was discontinued from the hind legs an increased temperature occurred in pelvis and rectum and at times a small increase also occurred in the subdiaphragmatic region.

11. Rough handling of exposed intestines caused a drop in temperature of these viscera; this was shortly followed by a rise to an even higher temperature.

12. Viscera exposed outside the abdominal

cavity showed a decreased temperature compared to the uneviscerated intestines. A small mass of intestines showed a greater drop in temperature than did a much larger mass when exposed, provided the exposure did not last over sixty to ninety minutes.

13. The dry surface of the exposed viscera approximated that of the surrounding air if the temperature was within two or three degrees of the temperature of the mass as a whole. If the difference was greater the surface temperature tended to parallel the temperature of the mass of exposed intestines.

14. Exposure of eviscerated intestines over a period of time, especially if the mass of intestines was large, caused a decrease in the temperature within the body cavity.

15. The exposed dry surface of the gut was about two degrees cooler than the exposed mesentery of the same gut. This exposed mesentery was two or three degrees cooler than the mass of eviscerated intestines.

16. Hot wet towels aided in keeping up both the temperature of the intestinal surface and the temperature of the mass of intestines to practically that of the uneviscerated intestines.

17. Cool wet towels lowered both the surface temperature and the temperature of the mass of exposed intestines. The temperature of the inside mass of intestines was lowered 0.1 C. to 1.0 C.

18. Cool wet towels applied to the surface of the exposed viscera caused a very peculiar curve of temperature values in the mass of exposed viscera. Apparently this was due to arterial spasms stimulated by the coolness of the towels.

19. At the operating table variations in intraperitoneal temperature and decreases upon exposure were confirmed in human beings.

20. In one instance a testicle exposed less than eight minutes during a combined hernia and hydrocele operation rose 4.5 C. when replaced inside the scrotum within the following fifteen minutes.

21. In two patients with abdominal ascites the application of ice bags, the outside temperature of which approximated 10.0 C. to 12.0 C., reduced the temperature beneath the parietes 4.2 C. and 8.7 C. respectively.

CONCLUSIONS

1. The therapeutic use of cold applied to the external abdominal wall is accompanied by a decrease in the subjacent intraperitoneal temperature. A decreased temperature but of less degree is found also in neighboring intraperitoneal regions.

2. The therapeutic use of heat applied to the external abdominal wall is accompanied by an increase in the subjacent intraperitoneal temperature.

3. Diathermy applied about the diaphragmatic region would be quite effective during an operation in maintaining the intraperitoneal temperature in the upper abdomen; and to a less degree in the lower abdomen.

4. The application of cold, heat, or diathermy to the abdominal wall is followed by a change in the general body temperature as evidenced by the changes in the more distant intraperitoneal regions and in the rectal temperature. The amount of change is influenced by the total body area which is contacted by the thermal agent, by the temperature of the thermal agent, by the length of time the agent is applied, and, especially in the case of diathermy, by the depth of narcosis (light narcosis being accompanied by dyspnea and a lesser change in temperature).

5. The temperature of the rectum, both under normal conditions and when under the influence of thermic agents applied to the abdominal wall, is markedly variable when compared to the temperature of the pelvis and other regions within the abdominal cavity. Hence the value of the rectal temperature as an indicator of the exact temperature within the abdominal cavity, and presumably other regions of the body, is seriously questioned. If, as seems at times, the rectal temperature represents a purely local temperature determination its value then must be only suggestive rather than decisive.

6. Since the rectal and pelvic temperatures continue to rise for fifteen to twenty-five minutes after removal of the diathermy applied about the diaphragmatic region, we can assume that great readjustments are taking place in the circulation, resulting in both the redistribution of and the releasing of heat. It is interesting to speculate upon the possible extremely high intraperitoneal temperatures that could occur with a patient in a Turkish bath or any thermal or

electrical contrivance for elevating the body temperature. It is possible that the intraperitoneal temperature would be enormously higher than even the very high oral or rectal temperature that could be thus obtained.

7. Exposure of and moderate handling of the intestines for sixty to ninety minutes caused no changes in temperature which would seem to be deleterious. Possibly this fact should not be lost sight of in operations upon the abdomen.

8. Hot wet towels are of proven value both in retaining the practically normal surface temperature and the glistening appearance of the exposed intestines, and in maintaining the normal temperature of the mass of exposed intestines.

9. When cool towels are once applied, if unfortunately they are the only ones to be obtained, they should not be changed frequently, but should be allowed to remain in situ as long as needed.

10. If intestines must be brought out of the abdominal cavity it appears to be extremely important to have an adequate incision, because the partial occlusion of the circulation from inadequate exposure produces a marked decrease in temperature.

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THE RAW APPLE TREATMENT OF DIARRHEA IN PEDIATRIC PRACTICE

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A survey of the American literature reveals few articles on this subject. Up to the present there have been only six papers written describing this method of treatment.

In January, 1933, Birnberg[1] wrote the first paper for an American publication. It was a splendid article in which he gave an historical review of the subject and described his experiences with a large number of cases of diarrhea treated with raw apple. He also gave the theoretical considerations of its therapeutic value.

The two most recently papers by Kaliski[2] and by Giblin and Lischner[3] are also comprehensive articles describing their satisfactory results with this mode of therapy in their cases of diarrhea.

Read before the Chicago Pediatric Society, February 18, 1936.

Papers by Reglien[4] by Rowley[5], and by McCaslan[6] appeared in the interim.

The European literature, on the contrary, contains vast numbers of reports which are all in accord in their belief that this treatment has definite therapeutic value. Since 1930 about 60 articles have appeared in practically every foreign language, principally in German.

Heisler, a practitioner in the Königsfeld Schwarzwald, used raw apple in treatment of diarrhea for twenty years before he published the results of his observations in "Dennoch Landarzt" and in "Ärtzliche Rundschau" in November 1929.[7] Credit is also given to Sister Frieda Klimsch, who had used this treatment for several years in a children's sanatorium in Königsfeld. Moro's[8] reports of its use in his clinic are directly responsible for the popularization of this treatment. His suggestions have been followed by other pediatricians whose results have also proven to be very satisfactory. Moro's original report appeared in December, 1929, at which time he related his experience with 52 cases of diarrhea in infants and children. Cases included in this series were 22 acute dyspepsias, 15 dysenteries, 1 typhoid, 8 chronic dyspepsias, 5 celiacs and 1 mucous colitis. His clinical observations were as follows: normal stools in two days, frequently in one day; vomiting ceased; temperature dropped; abdominal cramps and tenesmus disappeared. His results with chronic diarrhea were not as certain or regular as in the acute cases. In celiac disease he found that they temporarily had formed stools.

It is with a great deal of suspicion that one originally looks upon the suggestion that raw apple be used in the treatment of diarrhea. We are all familiar with the expression "an apple a day keeps the doctor away," but have analyzed this as being due to the regularity and free action of the bowels. It is, therefore, with considerable timidity that a pediatrician would recommend to the mother of a diarrheal child that she feed her youngster nothing but raw apple for a day or two. This suggestion is usually followed by the expected reaction on the part of the mother, but upon the Doctor's insistence she will usually agree to go through with the treatment.

In my practice, both private and clinic, I

have never found any one form of treatment that so simply and uniformly corrected a diarrheal tendency. These cases have varied from mild diarrheal conditions to severe cases with watery stools containing varying amounts of blood and mucus. Patients varied from the new-born period to eight years of age.

In no instance has an aggravation of the bowel condition been encountered and in many cases serious acute or subacute diarrheas, from a variety of causes, have within several hours taken an about face and quickly begun to improve. Many of these cases had had a fair trial on many other standard therapeutic procedures in the treatment of diarrhea in infants and young children such as protein milk, skimmed lactic acid milk, bismuth, paregoric, chalk-mixture, Kaomagma, tea, barley and rice-water. Some also had as supplementary therapy subcutaneous or intravenous fluids.

This series included diarrhea varied in etiology from those due to a simple dietary indiscretion, to those associated with parenteral infections. Stool frequency varied from 2 or 3 to 20 watery evacuations daily.

In Kaliski's series of 27 cases, ranging in age from 1 to 11 years, stool culture revealed B. enteritidis, B. paratyphosus, streptococcus hemolyticus, B. pyocyaneus and staphylococcus albus.

Giblin and Lischner's report includes 130 cases of enteritis, enteral and parenteral, treated with raw apple with a mortality of 0.8%.

The treatment is very simple, consisting merely of feeding the child scraped raw apple in varying amounts depending upon the patient's size and age. The caloric value of the scraped raw apple is 60 per 100 grams.

Heisler's[9,10] suggestion is that 100 to 300 grams of apple be given per meal. For adults he recommends 7 to 20 medium sized apples per day. No exact dose can be recommended for children, but the average six-month-old infant can easly take 1 or 2 tablespoons every 2 or 3 hours. Weak tea ad lib. is allowed between feedings but all other food is prohibited.

This restricted feeding is continued for 24 to 48 hours, occasionally 72 hours, until the stools have definitely become more firm in consistency. This is frequently noted as early as 8 to 12 hours after the institution of the treatment. The patients usually take the apple readily for it is sweet, palatable, thirst-quenching, and appetite satisfying. Associated vomiting usually ceases with the administration of the apple. It is exceptional for patients to refuse this fruit, but if the sour taste is objectionable, mashed banana or saccharin may be added.

The apple is peeled, scraped and mashed before feeding, although some clinicians prefer to use the apple with the peel, claiming for the outer covering many satisfactory therapeutic qualities.

Heisler believes that the uniformly good results obtained with this diet in practically every form of diarrhea, especially in children, is due to the detoxifying action of the apple pulp, the mechanical purification and the adsorptive power of this substance probably due to the malic acid. He considers the tannates to be of additional therapeutic value but since the apple contains only 0.05% of tannic acid, we can hardly give much credit to this substance. All of these factors serve to allay the irritation of the bowel's motor apparatus.

György concedes Heisler's theories and adds his own idea which claims for the pectins a very valuable place. Mayloth[11] claims that pectin has a primary colloidal and buffer property and that it regulates the H ion concentration. It adsorbs toxins and acts as an inhibitor of peristalsis through its calcium and magnesium content. The apple adsorbs and enmeshes the bacteria, mucus and toxins from the mucus membrane of the bowel. Mayloth found that this diet lost its effectiveness upon the addition of a ferment which destroys cellulose and pectin.

Schreiber[12] found that this diet favored a marked growth of colon bacilli with the disappearance of pathogenic organisms from the stool.

Schachter[13-16] has had good results feeding raw apricots and pears to a 13-month-old infant who had soft bloody stools for 10 days and who within 48 hours developed normal stools on the raw fruit treatment. He used these fruits because of their botanical relationship to apples when good apples were not available.

To insure a constant and uniform supply of good apple pulp the Germans have prepared powdered dried fresh apples called "Aplona." One hundred grams of the powder represents 1000 grams of fresh apple. It is administered in warm water or weak tea and sweetened with

saccharin. The powder is allowed to remain in the water 5 minutes and solutions of 1 to 10% are used. Wolff[17] recommends the 2% solution being used under 6 months of age.

A most interesting report appears in the German literature. It is a letter sent to Moro[18] by a Dresden soldier who relates his experiences during the war when he and four of his comrades were suffering from severe diarrhea with bloody stools. It was in July, 1916, near Tarnopol in Galicia. He and his four comrades came upon an apple orchard and being hungry, thirsty and dehydrated, all but one of the five ate freely of these only partly ripe apples, peeling and all. The four who ate large numbers of these apples were quickly relieved of their diarrheas. One soldier abstained from the apple diet because he feared it would aggravate his bowel condition. This soldier died with a severe diarrhea.

Kohlbrugge[19] advises cooking the whole apple because the layer just beneath the peeling is richer in acid than the pulp. He theorizes that the reason for the relative freedom of breast fed infants from diarrhea and for its value in the treatment of diarrhea in early infancy is due to the fact that breast milk has more acid than cow's milk. He considers tannates of no value in diarrhea but that the Säure of apples and other fruits produce the good influence. He also claims to have had good results with the feeding of lemon juice to children with diarrhea. Heisler has found the juice of strawberries and of red currants valuable.

In 1908, Moro recommended carrot soup in the treatment of diarrhea. He considers the therapeutic principle somewhat similar to that of the raw apple diet.

CASE REPORTS

1. Baby W., a female infant, weighed 7 lbs. 8¼ oz. at birth. The delivery was normal and the mother was healthy. At 5 days of age vomiting developed and there was a loss of one lb. in weight with marked dehydration. The case was seen with Dr. I. Singer. At 8 days of age there were 5 to 6 liquid stools daily. There was a low grade temperature and the diagnosis was infectious diarrhea.

The baby failed to respond to the feeding of breast milk, tea and Ringer's solution along with subcutaneous injections of 5% glucose in saline, 60 cc. four times a day. This regime was continued for 2 days with no improvement in the baby's condition. The subcutaneous fluids were discontinued and calcium carbonate 5 grains q.i.d. and atropine sulphate 1/1000 grain q.i.d. were given. The regurgitation and liquid stools continued, dehydration was extreme and the baby was irritable, fretful, listless and passed some blood with the watery evacuations.

At 15 days of age the weight was 5 lb. 11.5 oz. and the nurse recorded the baby as extremely listless. The prognosis was considered very poor. At 1:30 P. M. on this day, raw apple was given to the infant, 2 teaspoons every 2 hours. The infant took it eagerly and retained it, never once vomiting the feeding. Tea was taken well between feedings. At 8:30 P. M. there was a small amount of liquid stool with particles of fibrous material. At 2 A. M. there was a moderate amount of semi liquid stool and at 6:30 A. M., 17 hours after this treatment was instituted the nurse's note was "baby's condition seems improved." At 2 P. M., 24½ hours after the apple diet was begun, breast milk 1 oz. every 3 hours was given and retained. At 8 P. M. there was a small curded stool. The breast milk was gradually increased in amount and at 21 days of age the weight was 6 lbs. 4 oz. At 9 months, never having had a recurrence of this bowel condition, the baby weighed 22.5 lbs.

2. Baby B., a male infant, 1 month of age, weighing 4 lbs. 12 oz. was admitted September 2, 1935, with a history of vomiting and failure to gain. The next day there were 2 liquid stools and the passage of 2 to 6 copious liquid stools continued daily for 12 days. At 4 P. M. September 15, scraped raw apple treatment was begun. This day there had been 3 green liquid and one green soft stool. September 16 there was no stool and the following day 1 soft stool. Evaporated milk formula was given gradually and well tolerated after 48 hours of the raw apple diet.

3. Baby S. W. A four month old female infant weighing 10 lbs. was admitted September 24, 1935 at 2:30 P. M. with a history of 15 liquid stools daily for 2 days. Scraped raw apple diet was begun at 5 P. M. She had a soft stool at 9:30 P. M. and at 11:30 P. M. The next day there were 3 small soft stools and they continued to be normal.

4. B. J., a 7 month old male infant weighing 14 lbs. was admitted September 14, 1935, with a history of 6 to 8 liquid stools daily for 3 weeks. He had 2 to 5 liquid stools with mucus the first 5 days after admission. No improvement was noted with skimmed lactic acid milk and tea. On September 19 at 2 P. M., raw apple ½ oz. every 2 hours was started. This day there were 5 green semi-liquid stools, 1 green liquid and 1 green soft. The next day there were 2 soft green and 1 semi-soft green stool. On September 21, the 2nd 24 hours of the 48 hour apple diet, there was 1 soft yellow stool. Normal stools followed the institution of a full diet.

A sister, M. J., admitted on September 14 with a history of severe diarrhea, died the following day of gastroenteritis and bronchopneumonia.

5. E. W., a 5 months old male infant weighing 12 lbs. 15 oz. had had green loose stools for 2 days prior to admission. From July 15 to 21 he had 1 to 5 liquid stools daily. On July 22 raw apple diet was started. That day there was 1 yellow formed stool and the next day 1 soft yellow stool. Normal evacuations prevailed on a milk mixture thereafter.

6. E. F., a 7 month old male infant weighing 12 lbs., was admitted June 28, 1935, with a history of 10 to 15 liquid stools daily for 4 days. Persistent diarrhea with septic temperature was present for two weeks after admission. There were 5 to 10 liquid green stools daily in spite of attempts at correction with skimmed lactic acid milk, evaporated milk, tea, subcutaneous fluids and Kao-magma.

When placed on a raw apple diet, stools became soft in consistency and few in number within 48 hours and recovery was rapid and complete on a milk mixture.

7. M. M., a 3½ year old girl, had an acute enteritis which cleared up in 18 hours after raw apple diet was instituted.

8. R. S., a 3½ month old female infant, had a parenteral infection with frequent loose stools and loss of weight. The duration was 8 days. She failed to respond to anti-diarrheal medication of bismuth and paregoric with a lactic acid milk formula. The raw apple diet produced improvement in 36 hours with no recurrence of diarrheal symptoms.

9. S. T., a 3½ year old boy, had watery evacuations with extreme tenesmus for 4 days. The last day the stools contained bright red blood. The child failed to respond to a constipating diet and he refused all medication. The raw apple diet was begun and tenesmus and frequent stools were relieved in 10 hours.

10. I. R., an 11 month old female infant, had an acute enteritis secondary to an upper respiratory infection. Raw apple diet brought about the passage of formed stools in 16 hours. There was no recurrence of symptoms.

11. A. H., a 10 year old boy, had ulcerative colitis for 2.5 years with frequent evacuations containing large quantities of blood. He was placed on the raw apple diet and his tenesmus disappeared. The stools became firm and much less frequent, but the blood passage was only slightly diminished. The abdominal complaints of the patient were greatly minimized. Although no cure was anticipated in this case, it was interesting to observe that no aggravation of the bowel condition was produced by the raw fruit diet.

Twelve other cases with clinical records similar to those previously cited, showed quick relief from their diarrhea within 18 to 36 hours after the institution of the raw apple diet.

CONCLUSIONS

1. The raw apple diet as a treatment for diarrhea in infants and young children deserves much more attention than it has heretofore received in this country.

2. Twenty-three cases of enteral and parenteral diarrhea are here reported with uniformly good results within 14 to 48 hours after the institution of this treatment.

3. The youngest patient was 15 days old and the smallest 4 lbs., 12 ozs.

4. The acute diarrheas are the quickest to respond with firm stools.

5. This diet must exclude all other foods except weak tea or water.

6. This treatment has a definite place in the management of diarrhea cases especially where medication is refused or is difficult to administer.

7. The beneficial effects of the raw apple in these cases is probably due to the adsorptive power of the apple pulp, the malic acid, the pectins and possibly the tannates.

8. No other single therapeutic measure has so simply and uniformly corrected such diarrheas as are here reported.

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310 South Michigan Ave.

LOOSE LEAF SYSTEM

Professor: "Can you give me an example of a commercial appliance used in ancient times?"

Student: "Yes, sir, the loose-leaf system used in the Garden of Eden."—*Staley Journal.*

TWO MORE GUESSES

Excited young father: "Quick! Tell me! Is it a boy?"

Nurse: "Well, the one in the middle is."

SYPHILITIC AORTITIS, PATHOLOGY, DIAGNOSIS AND THERAPY

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Frequency of Syphilitic Aortitis. Syphilis is responsible for about 20% of all cases of chronic disease of the cardiovascular system found in adults. About 20% of all persons with acquired syphilis develop cardiovascular disease, which is a late manifestation. The average length of time from infection to the onset of cardiovascular symptoms is about 15 years. In luetic aortic regurgitation the average latent period is 20 years, in aneurysm 22 years. At autopsy we find that 75% of persons with visceral syphilis have syphilitic aortitis. The serologic tests (Wassermann, Kahn) are positive in about 80% of the various groups of cardiovascular lues. There are therefore 20% of cases with luetic aortitis, aneurysm and luetic aortic regurgitation who give a negative Wassermann test.

There is a marked preponderance of the male sex in the entire picture of syphilis of the heart and aorta. About 80% of the patients are males. Yet there is no marked difference in the frequency of luetic aortitis in the two sexes.

In females luetic aortitis usually takes a benign course. The severe supra-valvular forms of the disease, which cause aortic regurgitation, stenosis of the coronary ostia and aneurysm, are much more common in the male than in the female sex. Of 80 syphilitic aneurysms of the aorta seen by Dr. Richard Jaffé at the Cook County Hospital in Chicago in five years only six were in women. Five of these were in negro women.

It is an established clinical fact that syphilitic heart disease is about four times as frequent in the negro as in the white. In the colored race aneurysms are twice as common as in the white race. There seems to be more severe destruction of the media by the spirochetes in the negro, both male and female. Another factor may be the greater number of hard manual laborers among the negroes. It is also significant that essential hypertension is about three times as prevalent among negroes as among whites, often with marked arteriolosclerotic renal changes. Greater damage to the media of the aorta, increased stress and strain, and the frequent occurrence of hypertension suffice to account for the higher incidence of aneurysm of the aorta and its large branches, and of aortic regurgitation, in the colored race. Jaffé found an incidence of 8.5% aneurysms in whites, and 16% in negroes among 103 cases of syphilitic aortitis. These 103 cases of aortitis were found in 1000 autopsies, making an incidence of 10.3%.

The percentage of aortic regurgitation found in cases of luetic aortitis averages 30%, of aneurysm about 35%. Stenosis of the ostia of the large arteries of the aorta is a frequent occurrence. The innominate, carotids and subclavians are involved in about 50%. About 60% of all cases of aortic regurgitation in patients past 40 years are syphilitic.

Pathology of Syphilitic Aortitis. Syphilitic aortitis is clinically a late manifestation of this disease. It is the most frequent cause of death in syphilis. The reason for the long average latent period of 15 to 20 years is not known. Infection usually occurs in the twenties and the highest incidence of luetic aortitis is near the 45th year. In congenital syphilis the latent period may be shorter.

The disease consists of a chronic inflammatory process which begins in the vasa vasorum of the adventitia and media. These small vessels undergo obliterative changes with secondary changes in the media. The media becomes infiltrated by round cells and plasma cells, the elastic fibers are destroyed. Small miliary gummas may even be formed, containing spirocheta pallida. There is an intimal thickening and wrinkling. The inner surface of the aorta becomes wrinkled and depressed by many small and large fibrous scars of pinkish or white color. Atheromatous changes are often combined with the luetic aortitis in an amount increasing with age. The mouths of the large vessels are often fibrosed and greatly constricted or entirely occluded. Thrombi may form in the narrowed lumen, especially when there is an atheromatosis. This stenosis of the ostia of the large arteries is of great value in diagnosis, leading to a pulsus differens, systolic thrills and murmurs along the course of the artery, or to complete absence of the pulse in one or both arms or even in the carotids. An absence of pulsation does not necessarily indicate

that there is no blood flowing through the stenosed ostia.

As the aortic wall (in some cases also the innominate, carotid, subclavian or other large artery) loses its elastic layer the wall becomes weakened, and it stretches under the influence of the blood pressure. We shall see that this dilatation of the aorta is the earliest diagnostic sign of syphilitic aortitis, and can be diagnosed in at least 75% of cases before the development of aneurysm, aortic regurgitation, or angina pectoris.

The width of the ascending aorta can be measured within 2 mm. with the fluoroscope and orthodiagraphic technique. It must be remembered that the aorta during life is stretched by the blood pressure, hence somewhat wider than post mortem. The determination of the size of the ascending aorta assumes the greatest importance in the early diagnosis of aortitis. The following figures may be accepted as normal values for the different ages:

30—40 years	2 —2.5 cm.
40—50 years	2.5—2.8 cm.
50—60 years	2.5—3.0 cm.
Over 60 years	3.0—3.5 cm.

When the orthodiagraphic measurement of the ascending aorta exceeds the above values syphilitic aortitis must be suspected. The length and width of the aorta depend upon the elasticity of the wall. When the elasticity is reduced the vessel becomes longer and wider. In old age this process is gradual and the above table gives the extent of the physiologic widening. With old age the aorta elongates and the arch rises, and the aorta becomes more tortuous. Hypertension may lead to slight widening and increased atheromatosis. The increased cardiac output in aortic insufficiency may cause some widening, together with the characteristic pulsation. Rarely rheumatic fever, mycotic infection, tuberculosis, or arteritis nodosa may lead to widening or aneurysm of the aorta.

Practically speaking, syphilis is the cause of aortic dilatation, and any marked dilatation must be looked upon as luetic.

The second important pathologic change is aneurysm formation. The aorta may dilate more or less uniformly, or locally. The wall may bulge in only one direction and produce a saccular aneurysm. Several bulgings may unite to form a large irregular aneurysmal sac. These may reach huge proportions, causing pressure symptoms or even rupture. Clots may form in the large sacs, with narrow channels for the blood stream to the larger arterial branches. Calcification of the wall may lead to a stationary condition.

The third, and one of the most important pathologic changes, is aortic regurgitation. This is found in about 75% of the cases diagnosed clinically. The disease frequently attacks the aortic ring, especially at the commissures. The cusps become thickened, adhering somewhat to the aortic wall, and separate at the commissures. The ring becomes stretched, the cusps are too small to close the lumen in diastole and regurgitation results. There is regurgitation at each of the commissures when they are separated, and also in the center of the lumen: We need not here discuss the findings in aortic regurgitation.

Syphilitic aortitis causes regurgitation, *never a stenosis.* The only valvular lesion caused by syphilis is an aortic regurgitation, and rarely a pulmonary regurgitation. The mitral and tricuspid valves are not affected, except in rare instances of gumma of the myocardium.

The fourth important pathologic change is stenosis of the ostia of the coronary arteries. We have already discussed stenosis of the ostia of the large aortic branches. Coronary stenosis is a very frequent finding which leads to anoxemia of the heart muscle with angina pectoris, left ventricular failure with paroxysmal dyspnea (cardiac asthma) and pulmonary congestion, and often death. The stenosis is so gradual that one ostium may be totally occluded without producing clinical symptoms or any gross myocardial changes. During the months or years that elapse there is plenty of time for the collaterals to enlarge so that the heart muscle gets its blood supply from the other coronary; and this may suffice when there is no marked hypertrophy of the heart and the patient avoids exertion. I have seen at autopsy four cases of luetic aortitis with total occlusion of one coronary ostium in patients with no clinical history of angina pectoris. Sometimes the ostium is covered by a small flap-like thickening of the intima. Also the presence of an aortic regurgitation reduces the blood flow in the coronaries still further by lowering the diastolic blood pressure. Sudden death is quite common in such cases of aortic

regurgitation with stenosis of the coronary ostia. In very rare cases a supernumerary vessel may furnish blood to the myocardium.

A sudden occlusion of a coronary artery by a thrombus or embolus leads to myocardial infarction or myomalacia, with death from ventricular fibrillation, acute cardiac failure, or rupture of the infarcted area. Or, healing may take place with fibrosis, thinning, or partial heart aneurysm. This may also occur in syphilitic aortitis with sclerosis of the coronaries (which is non-syphilitic). The luetic stenosis is very slow and progressive, requiring years. The effect of a coronary occlusion, therefore, depends largely upon the rate of occlusion. It often appears as if the stenosis of the coronary ostia protects them to a certain extent against arteriosclerosis by reducing the blood flow and pressure in these small vessels. The length of time which is usually necessary for the development of uncomplicated syphilitic aortitis with angina pectoris or cardiac failure is about fifteen years.

Fifth, come the changes in the heart muscle itself. The heart is as a rule not affected by a luetic aortitis unless there be an aortic regurgitation or stenosis of the coronary ostia. Aneurysms may reach a very large size and yet the heart remain normal. With aortic regurgitation a great load is put upon the left ventricle and it undergoes marked hypertrophy and dilatation, often producing the "cor bovinum." There develops a relative mitral insufficiency with a change in the heart form. It becomes "mitralized." Then follows a compensatory involvement of the right heart with ultimate failure of the entire heart. In rare cases a diffuse syphilitic myocarditis is found, with marked cardiac enlargement and heart failure. Occasionally a gumma occurs in the bundle of His causing heart block, or a gumma leads to rupture of a papillary muscle. Syphilitic myocarditis is certainly much rarer than Warthin of Michigan believed. The fibrous changes found in older luetic individuals are more easily explained as a result of arteriolosclerotic non-luetic coronary disease. Gummas or spirochetes are rarely demonstrable post mortem.

Diagnosis. In syphilitic aortitis the diagnosis is of greatest value to the patient in the early uncomplicated stage, before aortic regurgitation, aneurysm or angina pectoris have developed. I shall, therefore, stress the signs and symptoms which enable us to make the earliest possible diagnosis. Although regurgitation and aneurysm require about 20 years for their development, aortitis undoubtedly begins years before this time. In the first few years after the primary infection a clinical diagnosis of syphilitic aortitis is usually not possible, although early changes in the aorta and other arteries may already be present. A roentgen ray diagnosis can often be made during the first five to ten years after infection.

The earliest and most important diagnostic sign in syphilitic aortitis is the demonstration of a widening of the ascending aorta, or any other part of the aorta on fluoroscopic examination. We have already stated that any ascending aorta more than 2.5 cm. in diameter up to the age of 40, or 3.0 cm. to the age of 60, or 3.5 cm. above the age of 60 should be suspected of being luetic. This is especially true when the patient has a positive Wassermann, Argyll-Robertson pupils, absent patellar reflexes, syphilitic scars, perforated nasal septum or palate, any form of visceral lues, or central nervous system syphilis.

The entire contour of the aorta can be studied with the fluoroscope, and the ascending aorta accurately measured. In normal persons the right heart border consists of the right auricle, ascending aorta, and superior vena cava. The ascending aorta forms only a slight convexity beyond the right border of the spine in the postero-anterior view. Often the ascending aorta is not at all visible on the right side, especially in ptotic individuals with medianly placed heart. In obese persons with high diaphragms the heart is pushed up and more transversely placed and the arch of the aorta widened. The "aortic window" between the ascending and descending portion appears larger, but the aorta itself is of normal calibre. In the first or right anterior oblique position careful rotation of the patient enables the examiner to measure very accurately the width of the ascending aorta. With experience one can diagnose an early syphilitic aortitis from the increased prominence of the ascending aorta on the right side; its curve becomes fuller and the density of its shadow is increased in proportion to the dilatation. Orthodiagraphic measurement shows it to be wider than the normal. The aortic knob on the left side is often

enlarged, and extends farther upward and to the left. The giving of barium paste enables one to measure the descending portion of the arch, from the concavity in the esophagus wall to the left border (Kreuzfuchs method). The normal symmetry is disturbed and the aortic arch becomes asymmetrical. The angle between the heart axis and the aortic oval often is altered (Kienböck's asymmetry rule).

Although hypertension, aortic regurgitation, isthmus stenosis and marked atherosclerosis may cause slight aortic widening they are as a rule easily distinguished from the asymmetrical aortic dilatation of syphilitic aortitis. It must be remembered that luetic aortitis and atherosclerosis are frequently associated. It is never safe to assume a marked aortic dilatation as due to atheromatosis or hypertension. A definite aneurysm is practically always luetic. I have seen many cases of aneurysm with high grade atheromatosis. Some of these aneurysms remain stationary for years.

The patient should be rotated in both the right and left oblique positions, and the wall of the aorta in all of its parts should be studied for parallelism. Any departure from the cylindrical form is significant. In this manner aneurysms in the anterior or posterior wall of the aortic arch will be detected, also the not uncommon retro-cardiac aneurysms of the thoracic aorta.

The second most important sign in early luetic aortitis without insufficiency is the *increased manubrial dulness.* Dilatation of the ascending aorta and arch usually produces dulness behind the sternum at the level of the second and often also the first right intercostal space. An area of dulness exceeding three inches (7.5 cm.) in width is very likely due to luetic dilatation of the aorta, or aneurysm. As the dulness increases it extends to the right and downward. It also extends to the left, but not so far. Dulness to the left of the spine posteriorly is quite common in dilatation of the descending thoracic aorta. The dilated aorta causes pulmonary compression and atelectasis and this is easily found on percussion to the left of the spine.

The increased manubrial dulness may be accompanied by localized pulsation, most often in the second right intercostal space near the sternum, or the second or third left interspace. An episternal pulsation with a palpable aorta or aneurysm behind the sternum is diagnostic.

The third most important diagnostic finding is *the tambour or bell-like, ringing, aortic second sound.* It has been compared with the sound of the arabian drum or "tabourka." This peculiar musical quality is probably due to the tension on the aortic cusps produced by stretching of the ring, and perhaps also some loss in elasticity, and thickening, of the aortic wall. When accompanied by a distinctly palpable second sound or diastolic shock the tambour second sound is very suggestive of luetic aortitis. The heart sounds are often unusually well transmitted to the chest wall in the region of the dilated aorta or aneurysm, because the thin lung layer is displaced or reduced in size. The large artery lies in contact with the chest wall.

The changed character of the aortic second sound is the first physical sign in early luetic aortitis. In patients with marked hypertension it is more difficult to recognize the tambour sound.

A fourth frequent finding is a *systolic murmur at the base,* found in about two-thirds of the cases of uncomplicated luetic aortitis. The murmur is often harsh and heard best in the second right or left intercostal space near the sternum. It must be remembered that a systolic murmur at the base is a frequent finding in patients past middle life due to aortic atheromatosis or sclerosis of the aortic cusps in the absence of aortic syphilis. Therefore, a systolic murmur alone is not diagnostic of luetic aortitis. When due to syphilitic aortitis it is most likely produced by the intimal roughening and puckering, and also dilatation of the supravalvular portion of the aorta or the arch. Furthermore, the stretching of the aortic ring keeps the cusps under tension in systole. This is the most likely cause of the systolic murmur. The systolic murmur usually accompanies the diastolic murmur of regurgitation.

To diagnose an aortic stenosis, which cannot be due to syphilis, the systolic murmur must be accompanied by a systolic thrill, pulsus parvus, and evidence of rheumatic heart disease or subacute bacterial endocarditis. In rare cases arteriosclerosis of the valve may lead to a stenosis. In a young individual a systolic murmur in the aortic area, even when not accompanied

by a systolic thrill, justifies the diagnosis of an aortic stenosis due to rheumatic fever, especially when a mitral lesion is present. When an aortic stenosis is found it must have some other cause than syphilis. The writer has seen two cases of rheumatic aortic stenosis combined with luetic aortitis and aneurysm. In fact, the healed rheumatic aortic stenosis was given as the explanation for the absence of regurgitation in spite of marked dilatation of the entire ascending aorta and arch. I have stated in clinics that if a mild rheumatic aortic stenosis could be produced many of these patients with luetic aortitis would be protected against the most serious result of this disease, aortic regurgitation.

The importance of recognizing the fact that syphilis does not lead to aortic stenosis is well illustrated in the following interesting case observed two years ago:

Case 1. A young colored male, aged 35 years, presented himself in my ward because of the presence of a walnut-sized aneurysm of the right radial artery. This large pulsating aneurysm was located 2 inches below the right elbow. It measured about 1¾ by 1½ inch. On examination of the patient the following were found: there was a rough systolic murmur and slight thrill with maximum intensity in the second right intercostal space and transmitted into the carotids. There was a soft systolic murmur at the apex. The heart was slightly enlarged to the left with normal configuration. On fluoroscopic examination the aorta was of normal size, the ascending aorta measuring 2.5 cm. in diameter. The patient had a daily temperature of 100 to 101° F. The spleen was palpable. The Wassermann test was 2+. My diagnosis was: rheumatic endocarditis of the aortic valve with slight stenosis of the aortic ostium, slight mitral insufficiency, and subacute bacterial endocarditis engrafted upon an older rheumatic endocarditis; mycotic aneurysm of the right radial artery. A few days later the blood culture was reported positive for streptococcus viridans, and few red blood cells were found in the urine. The patient was transferred to the surgical service of Dr. Raymond McNealy who removed the aneurysm. Microscopic examination revealed a mycotic aneurysm with acute inflammatory changes and streptococcus viridans in the wall of the aneurysm.

One might easily have made the diagnosis of syphilis because of the positive Wassermann and the radial aneurysm. But I know from previous experience that the Wassermann test is sometimes positive in subacute bacterial endocarditis. The presence of the aortic stenosis indicated definitely that we were dealing with a non-luetic process. The patient presented no signs of syphilis, and the spinal fluid was normal.

A *fifth* important sign in the diagnosis of syphilitic aortitis is the *pulsus differens,* or even total absence of pulsation in one or more of the main branches of the aorta, the innominate, left carotid or left subclavian arteries. When the left carotid and left subclavian pulse, or only the left subclavian pulse, are weaker than the right an isthmus stenosis of the aorta must be considered. This is usually not difficult to diagnose, especially when the blood pressure in the left arm and lower extremities is lower than in the right arm. Inequality in the strength of the radial pulses is frequent in syphilitic aortitis. Such a difference should be traced to the brachial and subclavian artery. Differences at the wrist alone may be due to differences in the size of the radials or to an anomalous position of the artery. If the right subclavian and carotid are both weaker, then the innominate ostium is affected. All three ostia of the main arteries arising from the aortic arch may be involved, as in the following interesting case:

Case 2. This white male, aged 62 years, entered the hospital complaining of marked dyspnea and swelling of the ankles for eight months. He had lost considerable weight. He admitted a chancre many years ago.

On examination several striking cardiovascular findings were noted. There was a shaking of the frame with every systole of the heart, but the head was not affected. The radial, axillary and brachial pulses were absent on both sides. There was no pulsation in the right carotid. The left carotid presented a definite pulsation, with a distinctly palpable thrill which could be traced to its origin behind the head of the left clavicle. There was no thrill in the aortic area. There was also a loud rough systolic murmur over the left carotid. The femoral pulses were strong, of the water-hammer type, and the Duroziez sign was positive. There was a marked pulsation in the arteries of the toes, with a capillary pulse. The heart presented an aortic form with marked enlargement to the left. The transverse diameter was 7 inches. The aortic dulness was increased to 4 inches, and obtainable to the right of the sternum. There was a double murmur at the base. The heart rate was only 60. The blood pressure could not be obtained in either arm on account of the absence of pulsation. The pupils did not react to light. Wassermann was negative.

Fluoroscopic examination revealed a diffuse dilatation of the aortic arch, but no aneurysm. The heart was markedly enlarged.

The diagnosis was: Luetic aortitis with diffuse dilatation of the aortic arch; aortic regurgitation; occlusion of the ostium of the innominate and left subclavian arteries; stenosis of the ostium of the left carotid artery.

The patient did not react well to rest or digitalis, developed a heart block with a pulse of 40, and died 2 months after admission.

The autopsy confirmed the above diagnosis in full, and in addition revealed an anomalous origin of the

left vertebral artery direct from the aortic arch 2 mm. from the left subclavian artery. The intercostal arteries were markedly enlarged (collaterals). The ostium of the right coronary artery was almost entirely occluded. There was also severe atheromatosis of the aorta.

When the brachial pulse is weak the blood pressure is usually lower on that side. An absence of pulsation does not necessarily mean that no blood is flowing through the vessel. The causes of decreased pulsation in the large branches of the aorta in syphilitic aortitis are the following:

1. Stenosis of the mouth of the artery as part of the syphilitic aortitis, 2. thrombosis in an aneurysm or the artery near the mouth especially when there is an atherosclerosis, 3. deformity or compression of the ostium by pressure of an aneurysm, 4. rarely, an embolus from thrombi in an aneurysm.

Four years ago I saw a colored patient at the Cook County Hospital, who had no palpable pulse in the brachial or carotid arteries on either side. The findings were those of a diffuse syphilitic aortitis with dilatation of the arch of the aorta. There was no aortic regurgitation. The heart was of normal size. The Wassermann test was positive. This patient had frequent attacks of syncope which lasted for minutes. He also complained of cardiac pain on exertion. My diagnosis was a syphilitic aortitis with diffuse dilatation of the aortic arch, stenosis of the ostia of all three large branches of the aorta, and of the coronary ostia. The findings were confirmed at autopsy. The innominate ostium was only 2 mm. in diameter, the left carotid the same size, and the left subclavian entirely occluded.

A sixth sign of syphilitic aortitis is an *aneurysm of any portion of the aorta,* not infrequently the retro-cardiac portion, or of one of the large branches of the aorta. We have seen several cases of aneurysm of the abdominal aorta. At the Cook County Hospital I have seen eight cases of aneurysm of the innominate artery in the past five years. All were associated with the findings of a syphilitic aortitis. These cases are characterized by the development of a pulsating tumor above the right clavicle, with displacement and compression of the trachea. The superior vena cava may be compressed. The following cases are of interest:

Case 3. The patient was a 39 year old colored male. About six months ago he noticed a mass on the right side of his neck. He developed dyspnea and edema of the feet. Then followed a paralysis of the left arm and leg. A pressure developed in the throat and an irritating metallic cough. The blood pressure was 158/110 in the right arm, 170/120 in the left. In the right supraclavicular fossa there was a mass with expansile pulsation and palpable thrill. The pupils did not react to light. The heart was moderately enlarged, and there were no murmurs. Fluoroscopic examination revealed a luetic aortitis with widening of the ascending aorta, and a large aneurysm of the innominate artery. The patient began to expectorate blood. The diagnosis was syphilitic aortitis without regurgitation, diffuse dilatation of the ascending aorta, large aneurysm of the innominate artery, compression of the trachea, and slow bleeding from the aneurysmal sac. These findings were confirmed at autopsy. The paralysis was due to embolism from a fragment of a thrombus in the aneurysmal sac in the innominate artery.

Case 4. This patient was a 21 year old colored male, who entered the hospital because of pain in the back and abdomen. This pain had been present for 3 weeks, and was very severe. It seemed to localize in the lower back and right side of the abdomen. The abdomen was markedly tender everywhere, especially in the region of the ascending colon. Chest and spine x-rays were negative. The patient went home and returned 3 months later, complaining of frontal headache. He had convulsions followed by coma. He was afebrile, the blood pressure 230 systolic and 200 diastolic. Cardiorenal disease was suspected. Spinal puncture revealed the fluid under increased pressure with a positive Pandy reaction, and cell count of 15. Wassermann and Kahn were negative. The blood urea was normal. Neither syphilis nor nephritis could be established. The patient had another convulsion, the temperature rose to 103. He died 4 months after the onset of symptoms, again complaining of severe abdominal pain.

The autopsy revealed a gumma of the abdominal aorta with formation of an aneurysm that perforated into the retroperitoneal tissue. There was a partial thrombotic occlusion of the superior mesenteric artery and rupture of the right renal artery, with infarction. There was a focal encephalomalacia in the right temporal lobe.

The other symptoms usually found in uncomplicated syphilitic aortitis are 1. pain, 2. cardiac failure, 3. dyspnea, 4. palpitation, 5. edema. These are not of diagnostic value unless a syphilitic aortitis can be demonstrated.

Angina pectoris is quite frequent with luetic aortitis. It is usually of a severe type and progressive. The pain is the result of slow narrowing of the coronary ostia. This leads to anoxemia of the heart muscle with accumulation of toxic waste products. At first the pain is associated with exertion, later it becomes very severe even

at rest. Another factor in the causation of the anoxemia is the lowering of the diastolic blood pressure when aortic regurgitation develops. A certain number of the patients have hypertension with cardiac hypertrophy. The great increase in the volume of the heart muscle associated with the marked hypertrophy causes a still greater demand for nourishment at the same time that the blood supply is being slowly reduced. Coronary thrombosis is not common in this group of patients. Most of them succumb to cardiac failure before the coronary sclerosis reaches a high grade.

The heart may reach a large size even in the absence of aortic regurgitation, and death from congestive heart failure is the rule. With left ventricular decompensation the patient develops attacks of dyspnea. Frequently these occur at night hence the paroxysmal nocturnal dyspnea. Few cases develop fibrillation. Failure with normal rhythm is the rule. The cardiac failure is progressive and usually causes death in six to eighteen months. Cheyne-Stokes breathing is very common. In obscure cardiac enlargement in patients over forty years of age syphilis should be considered. To make a definite diagnosis evidence of syphilitic aortitis must also be found.

THERAPY

Cardio-vascular syphilis can be prevented by the treatment of all syphilitic patients in the sero-negative primary stage. This requires an early diagnosis by dark field examination of secretion from the primary lesion or enlarged lymph nodes. At this early sero-negative stage a permanent cure can be attained in a very high percentage of infected individuals. *Such a cure requires at least eighteen months of continuous therapy with arsphenamine and bismuth or mercury.* Twenty doses of arsphenamine and twenty doses of bismuth salicylate in 40 to 50 weeks are needed to assure permanent noninfectiousness. *Thirty injections of the arsenical and thirty to sixty injections of a bismuth compound in the first two years should be the therapeutic objective to prevent recurrence and late manifestations of syphilis.* With such treatment syphilitic aortitis would be prevented, as well as other forms of latent syphilis. A "cure" would be attained in about 90% of patients with a primary lesion. In latent syphilis the length of time necessary for a cure is more than eighteen months to two years. The maximum results are obtained with about twenty injections of arsphenamine combined with large amounts of heavy metal, the latter prolonged over long periods of time.

Wile, in a recent review of a large series of patients with cardiovascular syphilis, found that two-thirds of the patients with uncomplicated syphilitic aortitis had received no treatment prior to the onset of their cardiovascular symptoms. Eighty-six per cent. of the cases of aortic aneurysm had received no treatment for syphilis prior to the onset or detection of symptoms. *Practically none of the cases of syphilitic aortitis had received the present standard of anti-syphilitic treatment.*

The average length of time between infection and the development of cardiac symptoms is fifteen years, and aneurysm or aortic regurgitation required an average of twenty or more years. Patients with latent syphilis who have no symptoms, physical signs or x-ray findings of cardiovascular syphilis at the time of examination will require about ten years for this type of involvement to appear. In untreated latent syphilis about 20% may be expected to develop symptoms of cardiovascular syphilis. The above statements indicate the great necessity of intensive treatment of all patients with latent syphilis to prevent its most serious and fatal consequence, namely, syphilitic aortitis.

The treatment of patients with clinical evidence of cardiovascular syphilis is still an unsettled problem. The chief measure in the treatment of syphilitic aortitis is rest, more or less complete, according to the severity of the symptoms. Strain should be forbidden even in the mild cases. Overeating, excessive smoking, and the use of much liquor should be avoided. With cardiac enlargement, angina pectoris, aneurysm or aortic regurgitation the patient should remain quiet in bed, or in a reclining chair.

Angina pectoris and congestive heart failure are treated as for other causes. I wish to call attention to the great value of aminophyllin (given intravenously in doses of 4 to 7 grains in solution in about 10 cc. of water and injected slowly) in the treatment of the Cheyne-Stokes breathing of congestive heart failure. The result is usually very striking with great relief of the difficulty in breathing. This same treatment fre-

quently relieves the pain in severe attacks of angina pectoris or coronary thrombosis. Salyrgan given in 1 to 2 cc. dose intravenously is one of our most valuable diuretics, and at the same time is a useful mercurial antiluetic drug.

In the presence of congestive heart failure antiluetic therapy should be withheld until treatment of the failure has been successful. Hypnotics and narcotics may be necessary for insomnia and severe pain due to pressure by an aneurysm.

When the diagnosis of luetic aortitis has been established antiluetic therapy should be instituted at once, in the absence of congestive heart failure, serious renal or hepatic disease. Uncomplicated aortitis cases should receive potassium iodide in 10 to 20 grain doses three times daily for six to eight weeks. Mercury may be used by inunction, or intramuscularly (mercury salicylate ½ to 1 grain once a week until 6 grains have been given). Then neoarsphenomine should be given once or twice weekly in doses from 0.3 to 0.6 gram until ten to fifteen injections have been used. *It should be avoided in angina pectoris, and given very cautiously in aortic regurgitation.* After one month the arsenic course should be repeated. Four or five complete courses of mercury or bismuth, iodides, and arsenic should be given over a period of two years. After a few months two more courses should follow. Large amounts of bismuth or mercury are more successful than arsphenamine in producing clinical and serologic negativity in latent syphilis. Very satisfactory results are obtained in a majority of cases, with decrease of the symptoms and cessation of the growth of the dilated aorta or aneurysm. In aortic regurgitation very little can be accomplished with specific therapy. The cardiac failure must be treated with rest, digitalis, and morphine as in rheumatic cases. For aneurysm a low blood pressure should be maintained by rest, limited diet, and plenty of sleep. Clotting in an aneurysmal sac cannot be influenced. When there is bleeding absolute rest under the influence of morphine is indicated.

55 East Washington Street.

WHY HE DID IT

Mother—Tommy, haven't I told you time and again not to play with that bad little Tutweiler boy?

Tommy—Yes, ma. I was only playing with him long enough to win his new marbles away from him.

CARDIAC EMBOLI

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Virchow may justly be considered the father of the present conception of embolism. There were numerous workers in this field before him, but the true understanding of the cause and effect of embolism is the result of his doctrine, which is based on definite scientific, experimental and clinical research.

Before Virchow, it was thought that all intravascular blood clots formed in the places where they were originally discovered; while infarction was supposed to have been the result of blood coagulation within the capillaries.

That an embolus may migrate from a distant place and lodge somewhere along its route and cause obstruction was not even thought of. After Virchow, the entire idea of embolism changed.

With our present knowledge of effects and symptoms of embolism, a correct diagnosis of the condition can usually be made in the majority of cases. However, when we can discover no source of embolism, the true condition is either overlooked or misdiagnosed; especially is this true in cases which result from peripheral venous thrombosis without local manifestations. Then, not only is the diagnosis missed, but the prognosis will also be underestimated.

Embolism is a term applied to an obstruction of some portion of the vascular system, with an arrest of the circulation. The plug itself is known as embolus.

Emboli may be divided into:

1. *Cardiac,* when they are derived from the heart directly.

2. *Extracardiac,* when they are derived from a thrombosed vein. They travel along the venous circulation, enter the right side of the heart, and usually cause pulmonary embolism.

3. *Aseptic or Benign.* Such emboli are usually derived from an intracardiac thrombus, which forms in one or more of the heart chambers. Under certain circumstances, of which we shall speak later, small particles break off and enter either the systemic or the pulmonary system.

Read before the Northwest Branch, Chicago Medical Society, February 21, 1936.

4. *Septic or Infective.* These are derived from vegetations found on the mitral or aortic valves, or from a broken down valve itself, and are the result of acute or sabacute bacterial endocarditis.

A whole vegetation or only parts of it, loaded with microorganism, may get loose and cause not only mechanical interference with the circulation, but will also be a source of secondary infection in the place where it lodges.

5. *Paradoxical or Crossed.* Occasionally emboli from the right side of the heart may enter into the left side of the heart, and then into the systemic circulation by way of a persistent foramen ovale. This will occur, particularly, when the pressure within the right auricle is greater than in the left.

Even coronary emboli have been known to have their origin from a thrombosed vein of a lower extremity.

The vessel which an embolus will obstruct is often a matter of chance, although mechanical factors may play an important role in determining its course. It is assumed that, in its migration, the embolus will follow the blood stream in a straighter route than along curves and angles. It is also easier for it to enter a larger size vessel than to force itself into a narrower one.

The fact that the right branch of the pulmonary artery is larger than the left, while the branch supplying the lower two lobes of the right lung is larger than the one supplying the upper lobe, may perhaps account for the fact that pulmonary infarcts are most commonly found in the lower right lobe of the lungs.

The same probably also accounts for cerebral emboli affecting mainly the left side, since it is easier for an embolus to enter the left common carotid artery, which is a direct branch of the arch of the aorta, than into the right common carotid, which is a branch of the innominate, it being a branch of the arch.

It is obvious that the smaller the embolus, the smaller will be the vessel which it will obstruct.

Generally, the symptoms and effects vary with the character and size of the emboli, the size of the obstructed blood vessels, and the functional importance of the parts involved. In addition to the symptoms resulting from mechanical interference with the circulation, septic emboli may cause constitutional symptoms and suppuration with local abscess formation at the point of their lodgement.

Infarction results from occlusion of end arteries, as in the brain, spleen, retina, mesentery, etc., the infarct assuming the shape of the area included by the arterioles. Thus it will be either conical or wedge shaped. The color of an infarct depends on the height of the venous pressure in that area. Where it is high, as in the lungs, or in the intestines, the infarct is usually hemorrhagic in type, otherwise it is either anemic or mixed. When the tissue around an infarct remains alive, it will receive a supply of lymph and will therefore undergo "coagulation necrosis;" where this is impossible, as in the extremities, the process will be one of gangrene, either moist or dry.

When anastomosis of an artery is abundant, or when an embolus is so small as to obstruct only an arteriole or a capillary, the symptoms will be mild and of short duration, or they may be entirely absent. In mild degree of obstruction, or where the collateral circulation is established rapidly, death of the part will not ensue, although the nutrition will never return to normal in that part. The higher the type of specialized cells, as those of the brain cells or of the kidney tubules, the sooner will they die when deprived of nourishment.

The immediate effect of an embolus is an obstruction to the blood flow below the point of its lodgement, producing a local ischemia with distention and stretching of the vessel above the point of obstruction. This causes very sharp pain, especially when a larger vessel is obstructed and where there is no proper collateral circulation.

When an embolus only partly plugs a vessel, the onset is not as stormy, although a secondary thrombus may later close the entire lumen and produce severe symptoms in addition to the mild.

Individual Locations: Cerebral. It is estimated that about 25% of all emboli are cerebral, and that the left middle cerebral artery is affected in the majority of cases, causing right hemiplegia. When the affected blood vessel is small, the embolus will cause only localized paralysis with total or partial aphasia. Both conditions may improve in a very short time, although there is always some impairment of

function, and particularly the aphasia may be permanent. The improvement is due to the breaking up of the embolus into smaller particles, which are then swept on to unimportant areas.

Pulmonary. Emboli entering the pulmonary system are not as common as the systemic. They are derived either from the right heart, or they may be the result of extracardiac peripheral venous thrombi. The effect depends on the size of the arteries plugged. When the main trunk of the pulmonary artery or a large branch is involved, the pain in the precordium is excruciating, simulating coronary thrombosis, and the patient dies in a very short time as a result of "acute cor pulmonale" or acute dilatation of the right heart. A correct diagnosis is often very difficult.

"The clinical evidence of acute cor pulmonale, resulting from pulmonary embolism," say McGiven and White, "deserves consideration, because of the frequency and importance of the condition and of the common difficulty in diagnosis. The growing readiness of surgeons to undertake the operative procedure for the removal of the embolus from the pulmonary artery further emphasizes the importance of establishing a correct diagnosis.

"The symptoms and signs of extensive pulmonary embolism are variable, but predominating at first are those of shock—namely, collapse, pallor, sweating, apprehension, and a fall in blood pressure—to be followed by reaction to the infarction, itself—namely, fever and elevation of the pulse and respiratory rates. In none of our cases, did we find acute chest pain in absence of pleural involvement, but most of the patients complained of substernal oppression and suffocation. Respiratory distress was named in all cases."

A sense of suffocation was the most outstanding single symptom in my own cases, and the patients kept repeating that they were dying. In one case, phlebitis of the leg and in two cases, recent pelvic operations were considered to be the cause. All three patients died within thirty-six hours. Remission may occur when the vessels are not entirely plugged, and the patients may then recover.

The diagnosis, although very difficult, should be suspected when there is a sudden onset of respiratory distress with a sense of suffocation, following a recent operation, in the presence of phlebitis or some cardiac condition, and in women who recently had puerperal sepsis.

When smaller size branches are plugged, the symptoms usher in with a severe stitch in the pleura, the result of pleural edema. Either the base, or the apex of the lung may be involved, although in the majority of cases, the emboli lodge in the lower lobe of the right lung. Part of the dark blood of the hemorrhagic infarct extravasates into the air passages and is expectorated. There is some moderate elevation of temperature, dullness on percussion and other signs and symptoms simulating bronchopneumonia. In fact, the condition is often attributed to an ordinary pleuropneumonia. A careful check of the heart, or the findings of other possible sources of emboli, will often furnish a clue to the actual condition.

Emboli of the extremities. Large emboli will obstruct important arteries. They usually lodge at the bifurcation of the main vessels, saddling across the fork and blocking both branches. A common place is in the femoral or in the popliteal arteries, or at the division of the brachials. The onset is very sudden with severe pain, often paroxysmal. The leg, especially about the foot and ankle, is cold, pale, mottled with bluish-red spots. The condition is often attributed to phlebitis, especially when the femoral artery is involved. The pulse may return in some parts where it was absent before, probably due to the disintegration of the clot.

When the radial artery or the dorsalis pedis are blocked, there is severe local pain and tenderness. Neuritis or rheumatism is often thought of, while the real condition may escape the examiner's attention. A careful search for the pulse, which will be found missing, will put the examiner on the right track.

In the kidney. An embolus in the renal artery causes severe pain in the back, resulting from the stretching of the capsule, hematuria soon following. When blood clots form, the symptoms may resemble renal colic.

Splenic vessels are frequently affected by emboli, causing infarction. There is sudden severe pain in the left hypochondrium and in the back, often aggravated by inspiration, which stimulates a left sided pleurisy. Occasionally a perispleenic friction rub may be detected, and the spleen may become enlarged and palpable. There are also chills and fever, not so much the result of the infarction itself, as of the associated endocarditis.

Embolism of the coronary artery, although

rare, may occur. The pain in the chest is very severe and may last twenty-four to forty-eight hours. Sudden death may occur, if a large coronary branch is plugged. If the patient survives, the blood pressure falls, the lungs become edematous and profound collapse follows, the heart sounds diminish and the heart rate becomes very slow. In other words, the condition simulates an attack of coronary thrombosis.

The mesenteric arteries. Usually the superior is involved in the majority of cases, affecting the lower part of the jejunum and ileum. The condition is always grave. The onset may be gradual, but is usually sudden, with severe abdominal pain and vomiting, which may be bloody and even fecal in character, suggesting general peritonitis or intestinal obstruction. Intestinal bleeding may follow. The temperature is usually subnormal, with pallor and signs of collapse. Such symptoms are always an indication for early surgery.

Infected emboli in smaller arteries, as in the nasal, will cause local inflammatory redness and swelling and also probable account for pain and tenderness in muscles and joints. In superficial arteries, the infected emboli will cause inflammatory reaction and formation of embolic abscesses.

In about 50% of the cases of bacterial endocarditis, skin lesions may be detected. They are embolic in nature and appear in showers. Repeated search will usually reveal them at one time or another. Thus, non-elevated petechial spots occur in the skin, the fundi of the eyes, conjunctival and buccal mucous membranes. A common location is the back of the neck and sides of the fingers and toes or about the ankles and below the knee joints. A more general distribution may occur. The petechial spots are about ½ mm.—2 mm. in diameter, pale in the center and do not disappear on pressure. They should be differentiated from small angiomata, which we see in many patients and which are slightly elevated, cherry red in color and usually blanch on pressure.

Infected emboli may lodge in the spleen, kidneys, retinal vessel or elsewhere and cause infarcts.

"Splinter Hemorrhages," described by Blumer may occasionally be detected. They are very rare and measure about 4-5 mm. in length, and are several mm. removed from the growing edge of the nail.

Aseptic Emboli. "Aseptic emboli" are of greater interest to us, since they frequently follow auricular fibrillation, a condition which is very common. Auricular fibrillation may be the result of arteriosclerosis, hypertension, degenerative myocarditis, infectious diseases, thyrotoxicosis, or of nervous origin and is a frequent complication of mitral stenosis.

The rheumatic patients are usually children or young adults for whom we can do a great deal and who, under proper management, live for many years.

We shall, therefore, center our attention on the last group—auricular fibrillation in association with mitral stenosis—especially since nearly half of the cases are in the scope of that particular group, and practically every physician has such patients under his care.

What are the embolic possibilities in that group of patients?

In mitral stenosis, the "aseptic emboli" are derived from the intracardiac thrombi, which are always present in the left auricle, particularly in the auricular appendage.

It is not entirely clear why such thrombi should form in the heart. One theory is that in mitral stenosis, the narrow A-V ostium causes a retardation and sluggishness of the blood flow from the left auricle into the left ventricle, thus resulting in partial stagnation of the blood. In other words, it resembles the old theory of gallstone formulation. But while the theory may have some basis in the gall-bladder, the auricle is really not a pouch, but a channel. However, the theory cannot be entirely discarded, since the thrombi are usually found in the auricular appendages, which are partly pockets where the blood current is necessarily slower, thus giving rise to the possibility of clotting, just as in certain myocardial conditions thrombi will be found in the ventricular apices between the columnae carneae, where the circulation is also sluggish.

Another theory is the presence of local endocardial infection. Local endocarditis favors coagulation of the blood, which becomes adherent to the inflamed or raw surface of the endocardium. This theory again suggests the newer conception of gallstone formation.

Perhaps a combination of both conditions—the sluggish circulation, combined with a local inflammatory process, may be responsible for the formation of the thrombus.

At times, either the entire thrombus becomes detached, or a large part of it may break off and form a "ball thrombus." Lying loose in the auricle, it may completely plug the narrow A-V ostium and kill the patient almost instantaneously. Fortunately, ball thrombi are not very common.

In the majority of cases, only small particles break off and form emboli, which enter the arterial circulation and cause obstruction to the blood flow, below the point of their lodgement.

The circumstances leading to the splintering of the thrombus and formation of emboli may be explained on the following basis, in mitral stenosis, even under normal circumstances, the possibility of a piece breaking off is always present in an ever present thrombus. However, the probability is rather remote. What really is needed to crush the thrombus into small pieces, is a sudden shock, such as an unusually strong contraction of the heart. Such strong contraction will follow extrastoles, as a result of the long refractory period, or when the rate returns to normal following paroxysmal tachycardia, or when the auricles assume more active contractions following the abolition of auricular fibrillation.

It sounds paradoxical that, with improvement, the patient's condition may become worse, but this is a fact, which is being recognized by most authorities.

Shall we then permit the fibrillation to go on permanently? The answer is, that permanent auricular fibrillation as such very seldom disturbs or annoys the patient. He is hardly aware of it, after it has lasted for some time.

"Auricular fibrillation is not in itself necessarily a dangerous condition," says MacKenzie. "The danger arises from the rapid action of the ventricles and the small and imperfect beats. In the majority of cases, the danger can be obviated by the judicious use of digitalis."

Before the patient develops permanent auricular fibrillation, he usually goes through a period of paroxysmal auricular fibrillation of shorter or longer duration, and it is during the period of sudden changes of rhythm that the patient is conscious and disturbed by his condition.

It is also in the state of sudden and frequent changes of rhythm that embolic accidents are likely to occur. If we could prevent temporary paroxysmal fibrillation, we could possibly also prevent cardiac emboli in many cases. Unfortunately, it is as hard to prevent the short paroxysms as it is hard to turn the paroxysmal attacks into a permanent fibrillation. Once the fibrillation is permanently established, the patient is certainly better off and should be left alone. It is obvious that we must avoid the use of such drugs, which tend to *cure* the patient of his fibrillation, if we wish to avoid embolic accidents.

DRUGS VS. EMBOLI

The drugs that I have in mind are digitalis and particularly quinidine.

What is the action of these drugs?

1. Digitalis: (a) Depresses the function of the pacemaker or the S-A node, and stimulates the vagus, which acts on the junctional tissue, hence (b) delays the conduction of impulses between the auricles and the ventricles and, therefore (c) slows the heart rate. The diastolic relaxation of the ventricles is longer: therefore, (d) improves the tone and strength of the heart.

2. Quinidine: (a) Slows the conduction in the auricular tissue itself; thereby slowing the rate of the circus movement. (b) Prolongs the refractory period in the auricular muscle. The advancing, circulating wave then running into a tissue, which is refractory, may and often does become completely abolished; the S-A node resumes the initiation of contractions, and normal rhythm is thus established. It is important to remember that in a large percentage of cases, the circus movement will only be lessened, but not entirely abolished, and the fibrillation will continue as before.

In auricular fibrillation, the auricles do not contract normally. They are in a state of paralysis and twitch or fibrillate perhaps 450 times per minute or more. A large number of small and weak contractions reach the ventricles which have to follow suit, hence, they beat very rapidly and irregularly and are thus overworked. By blocking such impulses, we cut down on the rate of the ventricles, hence giving them more strength. That is all we expect digitalis to do

for us. But digitalis *will not stop* the circus movement, that is the fibrillation itself.

Thus, there is only one thing that quinidine may at times accomplish, which digitalis will not, and that is, it may change the abnormal auricular rhythm to a normal one, which is undoubtedly beneficial, but by doing that, it may force out emboli into the circulation.

Says MacKenzie: "From all reports, it (quinidine) is proving itself to be a very potent drug, potent for both—for good and for evil, and it evidently requires great discrimination in its use" and "while it seems to have the power of restoring normal rhythm in a goodly proportion of cases, its use is not without danger. One source of danger was perfectly clear to me—the throwing out of fragments of clot, which may have formed in the auricle after the onset of auricular fibrillation."

"Embolism is especially apt to occur when the auricles resume their beating after they have been fibrillating, as in paroxysmal fibrillation or at the resumption of normal rhythm under quinidine." (Sir Thomas Lewis.)

"The emboli getting loose during fibrillation, or at a time of the return to normal rhythm which occurs either spontaneously, or as a result of quinidine therapy, which is often serious and sometimes fatal." (Paul White.)

At best, quinidine will cause the fibrillating auricles to resume normal contractions in some cases, but very rarely do the normal beats continue for some time. The fibrillation usually returns after either a very short time or perhaps after several months. The danger in inducing cardiac emboli is so great as a result of quinidine therapy, that one wonders whether such therapy should ever be undertaken.

Quinidine, undoubtedly, has its merits in some selected cases, but such are so few, that it is hardly worthwhile to employ it routinely.

CONTRAINDICATIONS TO THE USE OF QUINIDINE

1. It should not be used in cases where there is congestive and distressing heart failure.

2. Is not to be used in badly damaged hearts —myocardial degeneration and arteriosclerosis.

3. When there is a history of previous embolism.

4. When there is active acute or subacute bacterial endocarditis.

5. In the presence of fever.

6. Where there are multiple valve lesions.

7. In disordered conduction, like partial or complete heart block.

8. Where the fibrillation is of long standing.

9. In coronary diseases of the heart.

10. If the patient has not had a previous course of digitalis.

11. Should not be used in combination with digitalis.

12. Should not be administered, unless the patient is confined in a hospital where the action of the drug may be watched.

13. Is not to be used after one course of quinidine did not succeed in restoring normal rhythm.

Indications: 1. May be tried in paroxysmal auricular tachycardia to prevent the recurrence of an attack. The dose should be fractional.

2. May be used for symptomatic relief in auricular fibrillation, providing none of the factors enumerated under contraindications are present.

Treatment of Cardiac Emboli. It is not the intention of this paper to deal with the treatment of cardiac embili. The treatment depends on the organs affected and the symptoms arising thereby. Attempts have been made to remove aseptic emboli surgically, when discovered in the peripheral vessels, and the results reported in a number of cases are rather gratifying.

Strömbeck of Sweden reports 327 operations of arterial embolectomy after the first accident with 19% of various grades of improvement, some patients remaining alive from 1 to 10 years, the survival period depending on the age of the patients, the condition of the heart, and on new embolic accidents.

Thus, surgical procedure will prove of value only in isolated cases; in the majority of cases it is of little practical value, since surgical procedure should be resorted to immediately after the embolic accidents occur, otherwise the reaction will not permit it. As a rule, the patients associate the sudden pain with an attack of neuritis or rheumatism and employ home remedies, thus killing valuable time. Some patients are usually very sick, and one wonders whether it is worth while to subject them to the hazards of an operation, especially since more emboli are bound to follow.

I feel that quinidine should seldom, if ever, be employed in auricular fibrillation, and when used for some reason, the dose should be fractional. One should always be prepared for a possible emergency with cardiac stimulants, in

case of respiratory distress following the use of the drug.

The drug has not proven of any value to me in paroxysmal auricular tachycardia. In ventricular extrasystoles of nervous origin, it has not accomplished more than what simple sedatives, like bromides, would. I have good reason to believe that it may be of some benefit in auricular extrasystoles.

Levine suggests the use of quinidine in ventricular tachycardia arising in association with acute coronary thrombosis, where digitalis not only fails to slow the rate, but may even cause it to be more rapid. In his opinion, "quinidine sulphate in almost all cases can restore the heart to a normal rhythm, but he adds: "It must be borne in mind that quinidine is a dangerous drug, but the complication now being considered is in itself critical, apart from the other aspects of coronary thrombosis." In other words, since there is nothing to lose, the drug should be tried out. Levine also suggests the routine use of quinidine for the first two weeks after the onset of the attack of coronary thrombosis, in order to prevent auricular fibrillation, which may be a forerunner to an attack of a more serious nature.

As to quinidine in auricular fibrillation, due to thyrotoxicosis, where it may do some good without much danger of embolism, one feels that removing the thyroid, or where this is impossible, the use of Lugol's solution or x-ray therapy is more logical. But if thyroidectomy does not abolish the fibrillation, one questions the advisability of resorting to the use of quinidine.

Discussing the use of quinidine in auricular fibrillation, Carr says: "I am compelled, because of the experience we have had with the drug, to issue a warning regarding its presumed harmlessness." He states that several of his patients died soon after the normal mechanism was restored, and he feels that some, if not all of these fatalities were due to the effect of quinidine. One of the patients was a woman, who was convalescing satisfactorily following thyroidectomy. Since the fibrillation continued, she was given quinidine; the normal rhythm was restored, but the patient died suddenly, two days later. Most of his patients "proceeded from fibrillation to normal rhythm through an intermediate process of flutter," as checked by the Ekg. This point is interesting and perhaps very significant.

Digitalis is undoubtedly the drug of choice. However, even that drug is not without danger in auricular fibrillation, especially when used in large doses in order to stop the fibrillation.

"I have come to the conclusion," says Thomas MacKenzie, in speaking of digitalis deaths—"that the danger from digitalis occurs only in auricular fibrillation" and "the probability of its (embolic) occurrence makes me always somewhat anxious, when pushing the digitalis to restore the normal rhythm *in auricular flutter.*

From the above statements by MacKenzie and Carr, the conclusion is justified that the emboli form during the phase of auricular flutter which precedes the normal rhythm; and that they are forced into the circulation, after normal rhythm is established, that is when the auricles have regained their strength and can contract with greater force.

I have seen a number of patients improve rapidly on large doses of digitalis and die suddenly soon after the improvement, and I feel that rapid digitalization with massive doses is always a dangerous procedure and is rarely indicated. Experience has also taught me not to remove the edematous fluid too rapidly, thus avoiding circulatory collapse in some patients. Very little is gained by hurrying and it is best not to look for spectacular results in a short time. As a rule, the patient can wait a little longer. With gradual improvement, the possibility of serious accidents are usually minimized.

SUMMARY

1. Embolism will produce symptoms which simulate various other diseases, the real condition often being overlooked.

2. The possibility of embolism should always be suspected in the presence of heart disease, especially when there is an associated auricular fibrillation, when there was a recent operation, in the presence of phlebitis, puerperal sepsis or following quinidine medication.

3. Contraindications to the use of quinidine are numerous, while the indications are only few.

4. Quinidine, when used in auricular fibrillation to restore normal rhythm, will often cause embolism, hence, it must be used very cautiously and under careful supervision.

5. Auricular flutter preceding the normal rhythm may be the real cause of emboli formation.

6. It is best not to try to *cure* the patients of auricular fibrillation by employing drugs, especially when the condition is of long standing.

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PULMONARY TULAREMIA

Report of a case with necropsy

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The increased incidence of the diagnosis of pulmonary tularemia, either primary or as clinical manifestation of one of the commonly accepted four forms of human tularemia, is awakening new interest. Few cases have been reported with autopsy, and still fewer with histopathological studies which have pointed to a specific pathology for this disease. The following case is of interest both because it demonstrates the difficulty in diagnosing the pulmonary form of the disease and also brings more evidence to prove that pulmonary tularemia has characteristic pathological changes.

F. E., a male patient, aged 56, was admitted to the Cook County Hospital November 30, 1934. At this time he complained of malaise, chills, somnolence and a cough, all of ten days duration. The cough was productive of a gray green sputum occasionally streaked with red blood. An outside physician diagnosed his condition as lobar pneumonia and sent the patient to the hospital.

The family history and past history were essentially negative. For years, however, he had been a heavy user of strong drinks, tobacco and coffee.

On admission his temperature was normal, pulse 96, and respirations 26. The blood pressure was 90/60. The principal physical findings were in the right and left lung and chest. There were crepitant rales over the right lower lung posteriorly. There were also whispered pectoriloquy, increased fremitus and dulness on percussion over this region. There were occasional crepitant rales over the whole of the left lung. There was a small excavation on the posterior surface of the middle finger of the left hand. This was about 1 by 1 cm. and appeared as if the superficial epithelium (stratum corneum) had desquamated. The base was clean and pink and had no discharge. The edges were irregular. Other physical findings included several carious teeth and pyorrhea alveolaris.

The white blood count on admission was 9,950. Hemoglobin was 90. The differential blood count showed 72% neutrophiles, 27% lymphcytes and one monocyte. The urine showed a trace of albumin. Microscopic examination of the urine showed an occasional white blood cell in each high powered field. Stools were negative for blood, pus, and mucus.

Further questioning of the patient brought out the fact that he was a butcher. He had cut his finger while working but the wound had healed uneventfully. During the course of his work, presumably while the lesion was open he had dressed some rabbits.

Because of the predominant lung findings a provisional diagnosis of resolving lobar pneumonia was made, but because of the occupational history tularemia was to be ruled out.

Agglutination tests for tularemia on 11-30-34 and 12-7-34 were negative. The Widal test was also negative as were agglutinations for B. Melitensis, and porcine and bovine abortus. Both the Wassermann and Kahn tests were negative.

Although the temperature was normal on admission it rose to 103(M) by eight P. M. It continued to run a septic course for three days and slowly returned to normal on 12-6-34. On 12-3-24 the breath sounds over the right lower lung became rather distant and indistinct. The temperature rose to 105 again on 12-7-34 and ran a septic course until 12-10-34. At this time he suddenly became very dyspneic and cyanotic, the pulse became imperceptible and he expired. The white blood count rose to 12,900 on the third day after admission but there were no other changes in the laboratory findings.

Autopsy was done by Dr. P. J. Melnick. External examination revealed a strongly built fairly nourished white male. The lips and finger nails were slightly cyanotic. The lower pole of the spleen was at the tenth rib in the mid axillary line. The liver (lower border) was 4 cm. below the xiphoid and 1 cm. below the right costal margin. The right pleural cavity contained 500 c.c. of a blood tinted fluid mixed with flakes of fibrin. The left contained 50 c.c. of slightly cloudy brown fluid. Pericardial sac contained 50 c.c. of slightly cloudy straw colored fluid. The heart weighed 390 grams. The myocardium was a dark red brown, soft and friable. The coronary arteries contained numerous hyaline placques and there were numerous hyaline placques in the pars ascendens and descendens of the aorta.

The right lung showed a deeply injected pleura covered with yellow gray fibrin. The upper and lower lobes were subcrepitant to noncrepitant. In the upper and lower lobe there were multiple, deep purple red and granular areas of consolidation which were irregular and contained light gray soft centers. The largest of these areas which measured 20 by 25 mm. in diameter and was found in the mid portion of the upper lobe was centrally liquified with a cavity 8 mm. in diameter. The cavity was filled by brownish pus. In addition to the irregular areas of consolidation the right lower lobe revealed several wedge shaped, firm, dark red subpleural nodes. The branches of the pulmonary artery leading to these nodes were occluded by dark red, soft, blood clots.

The spleen weighed 185 grams. The pulp was deep purple red and soft. Six cm. from the pylorus of the stomach there was a 15 by 20 mm. oval defect in the mucosa with smooth terraced edges and a smooth light gray floor. Liver weighed 2,130 grams. It was soft and purple brown. The markings were indistinct. Pancreas weighed 90 grams. It was firm, lobulated and light yellow gray. The mucosa of the small intestine was light yellow gray. The large intestine was similar. The cortex of the adrenals was narrow and bright yellow. Kidneys together weighed 390 grams. They were firm. The surface was purple brown and had fetal lobulations. On the cut surface the cortex was 6 mm. The markings were indistinct. The mucosa of the renal pelvis was pale gray. The inferior vena cava was occluded by a moderately firm, friable dark purple blood clot.

Microscopic findings. In the section of the right lung there are large irregular areas in which the alveoli are filled by an exudate which consists of fibrin, mononuclear cells and erythrocytes. In places the exudate is necrotic and the necrosis also involves the alveolar cells. About the necrotic area the alveoli are dilated and the alveolar capillaries are engorged with blood. Near the necrotic areas the branches of the pulmonary artery show a marked proliferation of the intima which is cellular with many mononuclear cells and newly formed capillaries. The walls of the bronchi are infiltrated by lymphocytes and plasma cells. In addition to the large areas of necrosis there are many smaller areas in which the retrogressive changes are more or less advanced. About the foci of early necrosis there are recent extravasations of blood in and between the alveoli and in the interlobular septa. Sections of the lung stained with Pappenheim—Unna, Gram—Weigert and Nile Blue Sulfate stains did not reveal any of the organisms. In a section of a slightly enlarged lmyph node from the pulmonary hilus the sinuses are much dilated and filled with swollen and proliferated endothelial cells.

Post mortem agglutination test for Tularemia was positive on a sample of blood in dilution of 1/160.

The anatomic diagnosis was: Necrotizing bronchopneumonia of the right upper pulmonary lobe (Tularemia). Thrombosis of the inferior vena cava. Emboli in both main branches of the pulmonary artery. Hemorhagic infarcts in the right lower pulmonary lobe. Very marked septic softening of the spleen. Cloudy swelling of the liver, kidneys and myocardium. Catarrhal cystitis. Chronic peptic ulcer of the stomach.

Comment. It is evident from this case that the typical ulcerative lesion of tularemia associated with regional lymphadenopathy need not necessarily be part of the clinical picture. Whether the lesion described on the finger in this case is an atypical ulcer of tularemia or whether it was merely a portal of entry for the organism or whether it played no part in the disease is a matter of conjecture. If one assumes either of the latter two premises one may say that the lesion was primary in the lung.

The absence of the typical external lesion forces one to depend upon laboratory tests for making the diagnosis. Ordinarily the agglutination test is positive in the early stages of the disease but it is to be noted that it may take some time to develop.[1] In the present instance the test was not positive until the time of the patient's death. One case is on record of tularemia, proved at autopsy and by animal innoculation where the agglutination test never was positive.[2]

The histopathology described here reaffirms the characteristic findings of endothelial proliferation in the small arteries of the lung, first described by Permer and Weil[3] and later described by Francis and others.[4]

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THE ETIOLOGICAL RELATIONSHIP OF AMIDOPYRINE TO AGRANULOCYTOSIS

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Since 1931 when Watkins suggested the possible etiological significance of amidopyrine or its derivatives, many reports have appeared in the United States, Denmark, Sweden, Norway, Holland, and Germany accusing this drug. Among those who have described the disease associated with a history of amidopyrine-taking are Roberts and Kracke, Kracke and Parker, Madison and Squier, Randall, Hoffman, Butt and Hickey, Holten, Nielsen, and Transbol, Seeman, Fitz Hugh, Videbeck, Deversy, de Vries,

Jorgenson, Costen, Barfred, Zinninger, Andersen, Laren, Zinberg, Katzenstein and Wice, Benjamin and Biederman, Groen and Gelderman, Corelli, Knudson, Moltke, Johnson, Fisher, Sturgis, Zontscheff, Bock, Niekau, Naegeli, and Plum. However, the cases reported by the majority of these authors lack convincing evidence. Many of the patients had taken amidopyrine or its allied products for several years with impunity and suddenly developed the disease without apparent reason, and a substantial number developed the syndrome before amidopyrine medication was begun. Still, the very few cases of proved idiosyncrasy to amidopyrine illustrate its ability to produce the disease. Such cases are reported by Madison and Squier, Plum, Zontscheff, Bock, Niekau, and Sturgis. In these, the patients after recovery from their initial attack promptly developed leucopenia and neutropenia with typical symptoms of the disease after ingestion of the drug, and when the medication was discontinued the attacks ceased.

Amidopyrine may also produce other manifestations of idiosyncrasy, and then with an equal degree of rarity. Edema of the eyelids, of the cheeks and lips, blotches over the forehead, backs of hands, malaise (Unger), scrotal urticaria and genital edema (Crohn), and exacerbation of fixed eruptions have been described. In such allergic patients the patch, intracutaneous, and scratch tests have been found positive for amidopyrine (Meredith).

"If this (agranulocytosis) be an idiosyncrasy," writes Watkins, "it must be exceedingly rare, for enormous numbers of people use the drugs without known untoward reaction." The annual consumption of amidopyrine is prodigious. According to the Prescription Ingredient Survey of 1933 seven million prescriptions containing amidopyrine were written by United States physicians. A much vaster amount is sold over drug counters, and dispersed in hospitals. Yet the incidence of agranulocytosis is about 1 per 325,000 of population or approximately 385 annually. Were amidopyrine a cardinal etiologic agent the incidence of the disease would be much greater.

Some recent observations in this regard are noteworthy. In his study of 22 patients with agranulocytosis Jackson found 44% never to have taken any drugs whatsoever, while only 26% gave a history of amidopyrine medication. Naegeli observed 23 cases of agranulocytosis 21 of whom had not taken amidopyrine. The physician encounters a great number of patients suffering from this syndrome who deny having taken at a previous time any questionable medicament. It is significant to note that three of Jackson's cases were given amidopryine during the height of the attack and one died and two recovered. Limarzi and Murphy report a similar study of a patient given 370 grains of amidopyrine during her 4th attack of agranulocytosis and with recovery.

Many clinicians employing amidopyrine extensively have failed to observe its agranulocytosis-producing tendencies. Hoyne, who has used amidopyrine in the therapy of measles since 1929 at the Municipal Contagious Disease Hospital, and Cook County Contagious Disease Hospital, has not seen the disease in his measles patients. Custer reports that at the Philadelphia General Hospital having a year's admission of 29,488 the approximate consumption of amidoyprine during 1934 was 120,000 tablets; no agranulocytosis has been observed in 1,926 autopsies performed during the year. Nor has Markson encountered any at the Arthritic Clinic of Northwestern University Medical School where the drug is administered generously. At Cook County Hospital amidopyrine-caused agranulocytosis is of the greatest rarity. At several psychopathic institutions in the United States where the drug is consumed freely the disease has not occurred. Many German clinicians, amongst whom are Werner Schultz, Naegeli, Schilling, Schittenhelm, Dennig, Veil, Kissling, and Neergaard, also feel that there is no occasion to discredit amidopyrine.

The experimental attempts to produce the Schultz syndrome with amidopyrine in animals have been disappointing. The rabbits of Miller, the guinea pigs and white mice of Markson, the rabbits of Kracke, the rabbits of Schilling, the rabbits of Kunde, Herwick, Learner, and Sternback, the guinea pigs, rabbits and monkeys of Stenn, and those used by many other investigators, have failed to show an agranulocytic blood picture after administration of amidopyrine and its allied products by various routes, in minimal and huge doses, under vary-

ing conditions, and for periods of time varying from a week to eight months.

With this evidence our present unfavorable attitude toward the use of so valuable an antipyretic and analgesic and so excellent a therapeutic agent in measles lacks adequate basis, and the ban that some hospitals have applied to its use is apparently unjustified. Amidopyrine is to be no more condemned than arsphenamine, bismuth, gold, mercury and silver, all of which may act adversely and be causative agents of agranulocytosis as well as many other disease states. Shall we restrict the use of the arsenicals because they may produce aplastic anemia, or bismuth because of thrombocytopenia that may complicate its administration? Like these other drugs, amidopyrine is to be regarded as a very useful medicament but also as one to which a rare patient may be sensitive.

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BLACK WIDOW SPIDER POISONING

Report of Four Cases

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The black widow spider is common in certain localities, and is extremely poisonous. It looks like an ordinary spider, but is black. It is also called "hour-glass or shoe-button spider." The legs are of the same length as those of an ordinary spider of comparable size.

Three or four hours after a person has been bitten, a pustular eruption develops, with three or four pustules containing a watery fluid. The pustules increase in size and sometimes become as large as peas. Severe pain at the site of the bite spreads all over the body, reaching its maximum about an hour after the bite. Generalized muscle spasm and a boardlike rigidity of the

abdominal wall are present sometimes. Patient sweats profusely, is restless and anxious; sometimes spasmodic twitching of the muscles of the extremities is present. The affected area becomes swollen and edematous. The edema of the skin resembles that of renal or cardiac dropsy. If the bite is on the hand, this hand will appear twice as large as the unaffected hand; the neighboring glands become enlarged, and there will be an enlargement of the glands of the whole arm, and some of the glands of the neck and maxillary region. There is sometimes general malaise with nausea and vomiting, and the patient feels ill and slightly feverish. The pain becomes severe, traveling upward along the nerves, and the arm becomes so heavy that the patient is compelled to hold it with his unaffected hand. There were 380 cases reported with 17 deaths in 18 states. Most of the victims have been males.

Treatment. Hot baths or hot applications are helpful. I got good results with hot applications of saturated magnesium sulphate solution. Some cases required morphine for the pain. Proper elimination and the administration of large quantities of fluids are essential. The intravenous injection of 10% magnesium sulphate solution is helpful. The administration of convalescent serum acts almost as specific. Bogen has performed spinal puncture in a few cases with striking immediate relief. Browning treated patients with nitroglycerin with considerable relief.

REPORT OF CASES

Case 1. F. R., a man aged 31, retired at 9:30 P. M. in his usual good health. About four o'clock next morning he was awakened by severe pain over the fifth metacarpal bone of the left hand. The hand was swollen, and by 7 o'clock was nearly twice the size of the right hand. I saw the man at 9 A. M.; he was restless and looked toxic. On the affected area were three pustular eruptions containing a watery fluid. I painted the area with tincture iodine, gave the patient calomel and magnesium sulphate and applied hot saturated solution of magnesium sulphate to the affected area. At 4 P. M. he was feeling worse; the whole arm was swollen and a streak appeared traveling upward. The patient was very toxic with slight elevation of temperature and rapid pulse. He looked so toxic that I feared he would die in spite of all I could do. I saw the patient at 9 A. M. next day. He complained of severe headache and severe pain at the affected area; his temperature was 101° F. I gave him morphine for the pain and 10 cc of 10% solution magnesium sulphate intravenously, and ordered the hot application of magnesium sulphate to the affected area hourly. Next day the patient improved. On the fourth day he was much better and asked for food, the swelling disappearing very rapidly, and on the eighth day the patient completely recovered.

Case 2. C. H., woman, aged 44, who had always had good health, woke up during the night with severe pain in the right cheek. I saw her about 7 A. M., she was in agony and tossed about the bed, complaining of severe pain and headache; she was toxic, the right side of her face was red, hot and swollen and the condition resembled erysipelas. The right eye was swollen, and the patient could hardly open her mouth. I thought at first that she had toothache, but discovered that she had been bitten by a black spider. She vomited several times during the day. I gave patient immediately ½ gr. morphine and applied the hot magnesium sulphate solution every hour. The next day patient was delirious, had high fever and the swelling extended to the ear and neck; she was very toxic. The patient looked worse at 6 P. M. when I gave her 10 cc of 10% magnesium sulphate solution intravenously. During the night she developed diarrhea. The next day she felt better; there was marked improvement in her condition, the swelling disappearing from her face rapidly and by the ninth day she was up and around practically recovered completely.

Case 3. A. D., a man, aged 63, early in the morning was awakened by severe pain in his penis. I saw the man about 11 A. M.; he was toxic, complaining of severe pain and swelling of the penis and testicles; the penis measured 4 inches in length, about 2 inches in diameter, the testicles were palpable, and the condition resembled hydrocele. I gave him morphine for his pain and magnesium sulphate intravenously. The next day the patient was worse, his penis was twisted and edematous and measured 6½ inches in length and about 3 inches in diameter; he was very toxic. I gave him 10 cc of magnesium sulphate intravenously and 25 cc of convalescent serum intramuscularly. The next day patient was improving very rapidly, swelling was diminishing and by the sixth day penis and testicles were about normal size, The patient recovered completely by the ninth day.

Case 4. S. G., a man, aged 36, who had previously enjoyed good health, was bitten by a black spider in the leg below the knee. He did not pay much attention but one hour after he was bitten he noticed pain and swelling in the right leg. The pain became gradually worse which compelled him to go to bed. I saw the man eight hours after he was bitten; he was a pretty sick man and was in toxic state. His leg had the appearance of renal or cardiac dropsy. The pain was severe by this time and travelling upwards; he was very restless. The next day the patient was worse, very toxic, with swelling of the knee joint, he was unable to move his leg. I gave him morphine, and placed his leg high with hot applications of magnesium sulphate every hour, also 10% solution of magnesium sulphate intravenously. The next day there was no improvement in his condition, I gave him 25 cc of convalescent serum and the following day I noticed marked improvement in

his condition. He was improving very rapidly and by the tenth day he was up and around completely recovered.

Comment. The magnesium sulphate apparently relieves the pain, reduces the swelling and prevents the progress of the disease. The convalescent serum, however, acts as a specific in these cases. Gray states he got good results with convalescent serum. In none of the cases were bacteria found in blood or serum, and examination of the urine was negative. Blood counts revealed a slight increase in leukocytes, about 8,000 or 9,000.

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RESULTS IN OPERATION FOR INGROWN TOENAIL

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In a previous communication[1] published in one of the journals and since then transcribed in Christopher's Textbook on "Minor Surgery," the author has described a simple surgical procedure for relief of ingrown toenail, associated with a small group of cases operated on in the Mandel Clinic of the Michael Reese Hospital. Decision as to the efficacy of this operation must be based upon four factors: simplicity of technic; absence of incapacitation or loss of time; absence of complications; and permanency of results. It might be mentioned, of course, that prophylactic measures should be considered of precedent importance, as in any medical condition. Because of the relatively simple technic and minimum amount of surgical trauma involved in this procedure, it is unquestioned that the first three factors are well fulfilled in this operation. As to permanency of results, one might state that it is commonly admitted and frequently found that there is a marked tendency for recurrence of ingrown toenail, after operation.

In order to investigate this latter factor, the author was prompted to operate on a larger series of cases and observe them over a longer period of time. A group of thirty-one patients was operated on, including both clinic and private cases. After a period of eighteen months, it was possible to again make contact with only twenty of these patients. A simple questionnaire as to results of the operation, performed eighteen months previously, brought forth the following information:

Result 18 months after operation	Number of cases	Percentage of observed cases
Cured	13	65
Improved	4	20
No improvement (recurrence)	3	15
Cases observed	20	
Cases lost contact with	11	
Total cases operated on in this series	31	

As to the eleven cases which did not return for examination eighteen months after the operation, whether one might consider them as cured but not desirous of troubling themselves to return purely for the sake of scientific inquiry, or as not cured and having decided that permanent relief was futile, depends upon one's degree of optimism. For obvious reasons, these cases were not included in the determination of percentage results.

The operative technic employed may be briefly described as follows, as quoted from Christopher's Minor Surgery:[2]

1. A tourniquet, which serves both to make the field bloodless and act as a partial nerve-block, is applied at the base of the toe. A small piece of rubber tubing serves best for this purpose.

2. Sterilization of the field is obtained by iodine and alcohol.

3. Anesthesia is produced by injection of 0.5% procaine at the base of the big toe down to the bone on both sides, thus blocking off the nerves to the part to be operated on.

4. A small incision is made in the soft tissue of the nail fold and eponychium on a line with the incision to be made in the nail, and extending back to the matrix.

5. Chiefly by blunt dissection, the soft tissue is separated from the ingrowing piece of nail until the lateral margin of the nail is reached. This piece of tissue, which in methods previously described was removed, is retracted and preserved.

6. With small pointed scissors the nail is cut about ⅛ to ¼ inch from the visible margin, the incision extending back to the end of the matrix.

7. The loose piece of nail is grasped with forceps and, by gradual traction and separation from the nail bed, may be removed in one piece.

8. With a small curet the matrix and nail bed are curetted back to the innermost corner, so as to prevent recurrence of nail growth.

9. The wound is then treated with mercurochrome and packed with a small piece of sterile petrolatum gauze. The tourniquet is removed and the soft tissue replaced.

10. Daily dressings for a few days are necessary, after which the toe may be dressed every two or three days.

In cases in which there is marked swelling and sup-

Work done at Department of Surgery, Mandel Clinic, Michael Reese Hospital.

puration it is advisable to soak the foot in hot water containing boric acid for several days before the operation. Pain during the first night after the operation may be relieved by a barbital preparation, although this is usually not necessary if the technic described is employed. Throughout the postoperative course the toe maintains a practically normal appearance. A small incision in the eponychium is the only visible evidence of the operation, whereas by the old method there is left a raw, open surface, usually infected. The swollen, overgrown tissue (demonstrated as chronic inflammatory and not true hypertrophy by microscopic section) returns to normal size and soon has the same appearance as the tissue on the unaffected side. With proper care infection should not be present, and there is little danger of extension from previous infection as no wide blood channels are opened. Within reason, the patient may walk on the foot the same day as operated on.

Why some ingrown nails will return though others operated on by exactly the same technic do not, is difficult to explain, unless it is assumed that the patient has again subjected himself to the same causative factors that brought on the original condition. We are all aware of the frequency of this common condition. This is evidenced by the rapidity with which the number of cases multiply in clinic work when one displays interest in this particular condition. However, only the long-suffering patient can testify as to the pain and incapacitation involved in the untreated case. This is evidenced by his usual willingness to be operated on.

It is quite possible that one of the other operative procedures has a higher percentage of "permanent cures" than the one here described. If so, recognition should be made of this fact so as to eliminate as far as possible the patients' inconvenience at being operated on again and the surgeon's chagrin in seeing his patient back with complete recurrence of the condition.

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TUMORS OF THE PANCREAS

Tumors of the pancreas push forward from the depths of the epigastric and upper part of the umbilical areas, and present themselves as deeply-seated, vaguely-felt masses on palpation. They are best made out by examination under an anesthetic, move little on respiration, and often transmit a non-expansile pulsation.—"Medical Aphorisms," in *Radiological Review*, Jan., 1935.

SIDE REACTIONS ENCOUNTERED IN THE USE OF ESTROGENIC HORMONE THERAPY

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Estrogenic hormone therapy has assumed considerable importance in gynecology within the last decade. What particular forms will survive the present experimental stage remain to be seen. This paper considers some experiences encountered in the administration of a certain estrogenic hormone in oil. The following case histories elucidate the rather unusual reactionary sequelae:

Case 1: Miss H., aged 29 years, white, complained of irregular menses with lessening of the menstrual flow following instrumentation and vaginal treatments, nine months previous. The patient stated that she would flow for two days quite normally, stop a day, and soil a napkin for several days following. On administration of one-half an ampoule of theelin in oil, 1000 U., the patient described a painful itching sensation over the sites of the previous injections in the gluteal region. Other than this, no subjective nor objective complaint existed. Her menstrual history soon took on a normal character, and she was quite contented.

Comment: The subjective complaint of itching was lightly considered in as far as this was the first patient that manifested such a condition, and likewise as a definite benefit was experienced from the injection. However, a note was recorded to this effect, and other patients receiving theelin medication in my office were questioned.

Case 2: Mrs. H., aged 45 years, white, presented herself because of peripheral neuritis following massive doses of self-administered dinitrophenol tablets. During the course of history taking, considerable stress was laid upon recent symptoms associated with the menses. She would have splitting migraine headaches and attacks of nausea, followed by vomiting. Considering these complaints associated with beginning menopausal symptoms, theelin medication was instituted at the earliest opportunity. Again, a troublesome itching over the site of the injection was experienced. This patient stated that at times she felt as though she could tear the segment of skin out with her finger-nails. Her subjective complaints of vomiting and headaches became decidedly improved. In fact, she stated that other than a slight tendency to nausea, she felt perfectly well.

Comment: This patient was receiving treatment at the same time as the first case. But since her relief was so gratifying, we discounted the side reaction considerably.

Case 3: Mrs. M., aged 36 years, white, had had a very bad vaginal discharge, which proved negative for all specific diseases. Examinations revealed a very badly lacerated cervix with marked erosion. The cervix looked suspiciously malignant, and a trachelorrhaphy was performed. The laboratory report returned a pathological diagnosis of spurious precancerous tissue. Convalescence was rapid. However, several months later, the patient complained of menstrual disturbance, characterized first by profuse bleeding for ten days, then bleeding bimonthly. Finally, her flow lessened and an irregularity of menstruation set in, typified by a menorrhagia for two days, then stopping for thirty-six hours, followed by spotting for several days. Theelin medication was again considered in order, and injection begun. The first half ampoule had no deleterious effect worth reporting. On her second injection, the patient was aware of a slight general urticaria and itching over the area of injection. She neglected to report these symptoms on her subsequent visit. Consequently, a third ampoule was given. We talked in the office for a short time, and as it was my last appointment for the evening, departed together, walking several blocks down the street before parting company. The patient went directly to a restaurant for tea. But at that moment, she subsequently described a definite anaphylactic reaction. She had difficulty in breathing, felt extremely cold, yet perspired profusely. She said she was afraid to move, even to sip the tea before her, and began to experience an itching over her entire body. After several minutes she drank her tea and was able to depart for home. The next day, she had a typical urticaria over her face and body, and was unable to leave her residence for several days.

Comment: This patient was relieved with neosynephrin hydrochloride and alkalization. Her menses became decidedly better and at the last visit, she described her condition as excellent.

On reporting these cases before a hospital medical group, Dr. K. cited a similar case. He stated that following the injection of theelin in oil, 1000 U., his patient experienced a characteristic anaphylactic reaction requiring an ampoule of adrenalin before recovering.

Case 4: Miss J., a niece to Mrs. M., aged 23 years, white, had been complaining of a hypomenorrhea similar to the above described cases, and theelin medication was instituted. These cases were running concomitantly and unknown to each other. This young lady broke out with a severe scaling, itching dermatitis, especially disconcerting because of its invasion of her face and neck. Several days later, she complained of submaxillary swelling associated with pain. On examination, all the salivary and cervical glands were enlarged and tender, especially both parotids. There was no apparent pathology in either nose or throat, nor any subjective complaint of a cold. The condition lasted approximately ten days, and became amenable to heat, alkalization and ephedrine medication.

Discussion: The above cases are reported with the thought of emphasizing that theelin in oil must be administered with discretion; that, in spite of the claims of the manufacturers, side reactions occur, some quite disconcerting to the patient.

These reactions were made known to the manufacturers, and the oil contents of the ampoule suggested as the offending agents. It is conceivable that the patients were susceptible to the peanut or sesame oil diluent. However, a scratch test for these two oils was done on the patients with negative results.

Conclusions: Five cases of side reaction varying from simple local urticaria to generalized dermatitis, parotitis, and anaphylactic shock, following intragluteal injection of 1 c.c. ampoule of theelin in oil, 1000 international units per c.c., is herewith reported.

Evidence is presented to show that these reactions were not attributable to the oil diluents.

Theelin in oil intragluteally administered has a beneficial effect upon certain forms of menstrual disturbances.

No definite evidence can be submitted to account for the reactions described, other than the theelin itself.

One must be aware that side reactions occur, and be prepared to meet the exigencies.

30 North Michigan Avenue.

FEW PHYSICIANS IN UNITED STATES CONGRESS

The interest of the average physician in the conduct of the political situation of the country reminds one of Mark Twain's remark about the weather. He said, "Everyone is criticizing it, but no one does anything about it." Medical men criticize conduct of local, state or national affairs, but if the present medical representation in Congress can be used as a criterion, the profession has almost entirely lost interest in politics.

Time was when doctors of medicine were not uncommon in the Congress of the United States. One of the ablest men who ever sat in the Senate was Joseph H. Gallinger, M. D., who represented New Hampshire in the House for four years, and in the Senate for over thirty years. No other physician ever reached the pinnacle of fame which was attained by Doctor Gallinger. He was not only one of the oldest men in point of service, but he was easily one of the most influential.

Since his day, with the exception of the senior Senator from the State of New York, no physician has long graced the halls of Congress. Senator Royal S. Copeland is the only representative of his profession in the Senate today, and he has but four confreres in the House of Representatives.

Senator Copeland, formerly of the medical faculty of the University of Michigan, and mayor of Ann Arbor, and later dean of New York Homeopathic-Flower Hospital Medical College, came into the public eye as the commissioner of health in the city of New York, a position he filled with unusual credit for five years. Doctor Copeland was looked upon as one of the most outstanding public health authorities in the country during his term of office, and he was rewarded for his splendid work by election to the Senate in 1923. Senator Copeland was reelected in 1929, and again in 1935, making him one of the "older brethren" of that august body.

He had as an associate from 1929 to 1935, former Governor Henry Drury Hatfield, M. D., of West Virginia, one of the most prominent surgeons in that State. Unfortunately, the Senator was not reëlected, leaving Senator Copeland to carry the torch alone.

In the House of Representatives are to be found four medical Congressmen, three from the East and one from the Middle West. Dr. William L. Higgins of South Coventry, Connecticut, and a graduate of the University of the City of New York, 1890, represents the Second Connecticut District. He is a former president of the Connecticut State Medical Society; he served sixteen years in the General Assembly of his state, was secretary of state for four years, and was also a county commissioner and a selectman of Coventry. He was first elected to Congress in 1932.

The sole medical representative from the Corn Belt is William H. Larrabee, M. D., of Indiana, a graduate of the Indiana University School of Medicine, and a practitioner in New Palestine for thirty-three years. He belongs to the national, state, and county medical societies, is prominent in fraternal circles, and was formerly a member of the City Council, secretary of the County Board of Health, and a representative in the Indiana General Assembly. He is now serving his sixth year in Congress.

The State of New York has two physician-congressmen in the persons of Joseph L. Pfeiffer, M. D., F. A. C. S., of Brooklyn, and William I. Sirovich, M. D., F. A. C. S., of New York City.

Doctor Pfeiffer is a 1914 graduate of the Long Island College of Medicine, and is assistant surgeon to the Kings County and St. Catherine's hospitals. He recently sent to the Scientific Medical Institutione of Emergency Attendance at Leningrad, Russia, at the request of the Soviet Government, his survey of appendicitis from the years 1920 to 1932, a total of 4,176 cases. Doctor Pfeiffer is prominently connected medically with various of the leading institutions in Brooklyn.

Doctor Sirovich, a graduate of the Columbia College of Physicians and Surgeons in 1906, has been superintendent of the Peoples' Hospital since 1917. He was first elected to the Seventieth Congress in 1927, and has been very active in the House since that time. The Doctor is not only a member of various medical organizations and civic groups, but has been an official arbitrator in labor disputes and is much interested in child welfare and copyright matters.

This list constitutes the medical representation in Congress, but dentistry and pharmacy also have exponents in the Capitol.

The senior Senator from Minnesota, Henrik Shipstead, D.D.S., of Minneapolis, was graduated from the Northwestern University Dental School in 1903, and practiced his profession in Glenwood, Minnesota, until 1920, when he removed to Minneapolis. He still maintains an office in that city. The Senator was mayor of Glenwood for two terms, and was in the House of Representatives of his own state. He was first elected to the Senate in 1922, was reëlected in 1928 and in 1934.

In the House of Representatives are two dentists, Frank Crowther, D.M.D., of Schenectady, New York, and John M. O'Connell, D.D.S., of Westerly, Rhode Island.

Doctor Crowther was graduated from Harvard Dental School in 1898, and practiced in Boston until 1901, when he removed to Perth Amboy, New Jersey. In 1912 he went to Schenectady. In New Jersey Doctor Crowther was a member of the House of Assembly, and of the Middlesex County tax board. He was at one time president of the Common Council of Schenectady, and was first elected to Congress in 1919. He has served continuously in the House since that time, now being a member of the Ways and Means Committee.

Doctor O'Connell was graduated from the Philadelphia Dental College (now Temple University Dental School) in 1905 as the valedictorian of his class. He has practiced in Westerly since his graduation, except for sixteen months when he was overseas with the Twelfth Division. The Doctor is prominent in the life of Westerly and in the various fraternal groups. He is now serving his second term in Congress.

The sole representative of pharmacy is William D. Thomas, Ph.G., of Hoosick Falls, New York. He was graduated from Union College in 1904, went to the home town at once and continues to be the proprietor of the Thomas Pharmacy in Hoosick Falls. He was town clerk for eight years, a member of the legislature for two years, county treasurer for six years, and has twice been elected to Congress.

Our Canadian medical friends take their politics far more seriously. In the Canadian Senate today there are seven medical men; two each from Ontario and New Brunswick, and one each from Quebec, Manitoba, and British Columbia.

In the Federal House of Commons more than 10 per cent of the members who have been guiding the destinies of Canada during the past five years have been physicians. Twenty-nine out of the total membership of 245 were followers of Aesculapius. Ontario sent 14 physicians out of 82 Representatives to the Federal House; Quebec had 9 out of 65; Saskatchewan 2 out of 21; Alberta 2 out of 7; Manitoba 1 out of 17; and Nova Scotia 1 out of 12.

In addition to this, the provinces of Ontario and Sasketchewan each had a medical man as lieutenant-governor. Be it understood, the chief executive officer of all Canadian provinces is the lieutenant-governor.

Incidentally, the Canadian profession goes into politics in rather a big way. In the provincial legislature of

Quebec out of ninety members eight are physicians; in Ontario there are six physicians among 112 members. In New Brunswick one-eighth of the legislature of forty-eight men are doctors. Nova Scotia has four medical members; Sasketchewan, four; British Columbia, three; Prince Edward Island, two; and Alberta, one.

Sixty-three physicians, representing various constituencies in the Dominion and serving at one time, indicate that the medical profession in Canada is determined that its representatives will be heard in the halls of legislation.—*California and Western Medicine.*

BENZEDRINE SULFATE AND ITS VALUE IN SPASM OF GASTRO-INTESTINAL TRACT

Abraham Myerson and Max Ritvo, Boston (Journal A. M. A., July 4, 1936), have found benzedrine sulfate, a sympathicomimetic drug, to be of great value in diminishing or abolishing spasm of the gastro-intestinal tract. This effect is observed when the spasm is due to whatever cause, such as unpleasant emotion, organic disease of the gastro-intestinal tract, and reflex spasm due to disease elsewhere in the body. This effect greatly facilitates the roentgen study of the gastro-intestinal tract, makes differential diagnosis between functional and organic spasm more certain and gives better visualization of organic lesions. The effect is almost immediate and is, on the whole, unattended with any side effects of importance. Clinically it has been found useful in relaxing spasm, such as is found in spastic colitis and pyloric spasm, and this has been of therapeutic benefit to the patient. The dosage for the average patient is 30 mg. of benzedrine sulfate orally; very stout patients may require 40 mg., while thin and very young individuals are given from 10 to 20 mg. Unpleasant effects may occur in a very small number of cases and consist of chilly sensations, flushing, diarrhea and general malaise. The authors have administered the drug to more than 200 patients and in only one instance was there a severe reaction. There may be sleeplessness or restlessness during the following night if the drug is administered late in the afternoon. The drug causes moderate rise in blood pressure (about 20 to 50 mg. of mercury) and therefore it should be used with caution in the presence of severe cardiac disease.

TOOTHACHES OF PRIMITIVE MAN*

That primitive peoples have perfect teeth and that civilized man has acquired his dental troubles because of eating refined foods are ideas which are frequently expounded by reputable scientists as well as by food faddists. There are two possible methods of testing the accuracy of such statements. One method is to study the skeletal remains of early man, and the other is to observe and record the dental condition of existing primitive peoples.

There are far too few specimens of the very early forms of man, such as the Java man, the Piltdown man, or the Peking man, available for the drawing of any conclusions concerning their freedom from dental disorders. It is known that the Neanderthal man, who lived in the last interglacial epoch, suffered from the ravages of pyorrhea. Relatively little weight could be placed upon any immunity to dental diseases in these early types of man since their tooth and jaw structure is quite different from that of the present species of man, homo sapiens.

It is probable that our present species of man, homo sapiens, has always been more or less subject to dental troubles. This may be correlated with the refinement of the bony and muscular structures of the face and jaw, which has allowed man to develop the extremely valuable accomplishment of articulate speech. The men who lived in France during the last glacial period were troubled with carious or decayed teeth. Many of the skeletons of men of this period show decayed teeth. More than 20,000 years ago, in North Africa there lived a white people of the Mediterranean subrace. The type skulls of this culture are in the collection of the University of Minnesota. One of these skulls has teeth in an advanced state of decay.

*By Max C. Markley, Ch. E., Ph.D., professor of agricultural biochemistry, University of Minnesota, University Farm, St. Paul, Minnesota.

IT HAS ALWAYS BEEN SO

Once in a while R. G. Ingersoll, aided by his wonderful command of language, utters a sentiment worth preserving, and here is one of them. It concerns the alleged struggle between capital and labor: "Here is a shoe shop. One man in the shop is always busily at work during the day—always industrious. In the evening he goes courting a good nice girl. There are five other men in the shop and who don't do any such thing. They spend half of their working hours in loafing and their working evenings in dissipation. The first young man by and by cuts out from these others and gets a boot and shoe store of his own. Then he marries the girl. Soon he is able to take his wife out to ride of an evening. The five laborers, his former companions, who see him indulging in this luxury, retire to a neighboring saloon and pass a resolution that there is an eternal struggle between labor and capital."—*Exchange.*

DURATION OF FRACTURES AND OPERATIVE DEFECTS OF SKULL AS REVEALED BY ROENTGENOGRAMS (A FOLLOW-UP STUDY OF ONE HUNDRED PATIENTS)

In order to obtain some idea of the reaction of the skull to traumatic and surgical defects, Mark Albert Glaser and Edward S. Blaine, Los Angeles (Journal A. M. A., July 4, 1936), studied 100 cases by repeated roentgen examination over a period of from one to ten years. Linear fractures in children less than 6 years of age disappear within from six to twelve months after injury. In the minority of cases, linear fracture in adults begins to fade from six to nine months after injury and disappears in from twelve to eighteen months. The majority, however, show fading from eighteen to

twenty-four months after injury and entirely disappear from four to five years, rarely longer. In depressed fractures without elevation, the fragments become rounded and unite, and the lines of fracture cannot be detected, though the depression is apparent. In operative defects wherein the bone has been removed, or in cases of depressed fracture wherein the fragments have been removed, the cranial defect never becomes smaller, the only change being a rounding of the edges. Bone flaps may either undergo absorption or appear normal. Bone grafts properly placed form a definite covering over the defect. In medicolegal cases of old and recent injury the approximate age of the existing line of fracture may be determined. The status of questionable fracture lines may be determined by their fading and disappearance. Roentgenograms taken from six months after injury in children to nine months after injury in adults are as valuable as those taken immediately after injury in determining the presence or absence of fracture.

THE TACTICS OF OPPOSITION

1. *Be Noisy*

If the majority favors a plan, support it, but rage vociferously at the methods of the administration. Covertly obstruct. (This is called "deep stuff.")

2. *Make Lots of Noise*

Propose other plans. The more plans the greater confusion. (This is called "smoke screen.") If possible gather support for a plan that will defeat the whole movement. (This is called "counter-movement.")

3. *Be Loud*

Try to divide the supporters of the movement that you wish to obstruct or destroy. (This is called "the split.")

4. *Yell and Rage*

Challenge the sincerity of any or all leaders of the other side. (This is called "vilification.")

5. *Bewail*

Place yourself in a position where you may get bumped. Scream and cry at the terrible injury. This will excite some sympathetic support. (This is called "the squawk.")

6. *Roar*

Keep everybody as mad as possible. (This is called "inciting unrest.") Be quite careless with the truth, if necessary. Few take the trouble to investigate inflammatory allegations. (This is called "stretching it.")

7. *Rave*

Threaten and bull-doze. (This is called "throwing a scare" or "putting on the heat.") Occasionally let loose a dire prediction. The latter goes well. (This is called "auguring ill.")

8. *Moan and Groan*

Wear an air of deep suffering. (This is called "martyrdom.")

9. *Yawp*

When you see that the fight is hopeless, that the others are surely going to win out and that your cause is lost, claim all the credit. (This is called "getting on the bandwagon.")

10. *Side-Step*

Start something else. (This is called "staging a comeback.")—*Oregon Medical Reporter.*

Marriages

CHARLES ALLISON, Kankakee, Ill., to Miss Harriett Rossi of Braidwood, recently.

ABRAHAM I. RAMENOFSKY, La Salle, Ill., to Miss Elizabeth Lantin of Los Angeles, June 7.

Personals

Dr. Richard M. Davison was chosen president of the Chicago Tuberculosis Society at its annual meeting recently.

Dr. Ernest E. Davis, Avon, addressed the Jo Daviess County Medical Society in Stockton, June 20, on eclampsia, and Dr. George C. McGinnis, Warren, on injection treatment of varicose veins.

Dr. George de Tarnowsky was chosen president-elect of the Chicago Gynecological Society at its annual meeting , June 12, and Dr. Harold O. Jones was intalled a preident.

The Whiteside County Medical Society was addressed at Prophetstown, June 25, by Dr. M. Herbert Barker, Chicago, on "Treatment of Hypertension with Special Reference to the Cyanates."

Wilbur R. Tweedy, Ph.D., has been appointed professor and head of the department of physiologic chemistry at Loyola University School of Medicine, succeeding the late William C. Austin, Ph.D. He has been associated with the medical school since 1925.

The new officers of the Chicago Urological Society for the year 1936-37 are: President, Harvey A. Berkey; Vice-President, William J. Baker, and Secretary-Treasurer, C. Otis Ritch.

Drs. Clayton J. Lundy, LeRoy H. Sloan and George de Tarnowsky presented the scientific program at the July 6 meeting of Hancock County Medical Society at Carthage, Illinois. This meeting is in honor of five doctors of that county who are celebrating fifty years in the practice of medicine.

Dr. Ruben Nomland will assume the Professorship of Dermatology at the University of Iowa, Iowa City, July 1.

Dr. Clifford G. Grulee, Chicago, gave a paper on "Care of Premature Infants" before the McHenry County Medical Society on July 16.

Dr. George J. Musgrave, Chicago, addressed the Christian County Medical Society, July 23, on "Nasal Accessory Sinuses."

Dr. Rudolph Schindler has been appointed to the position of attending gastroscopist at Michael Reese Hospital, beginning July 1, 1936.

Dr. Harry L. Huber, Chicago, read a paper entitled "Allergy in General Practice" before the Menominee-Marinette Medical Society, July 9.

Dr. Perry J. Melnick has resigned as Pathologist at Springfield Hospital, because of the pressure of his duties at the Decatur and Macon County Hospital.

Dr. A. A. Law, of Chicago, addressed the Union County Medical Society which met in conjunction with the medical staff of the Anna State Hospital, May 14, 1936. A large group of physicians of southern Illinois were present.

Dr. Erwin P. Zeisler addressed the members of the DeKalb County Medical Society, June 25, on "The Treatment of the Commoner Diseases of the Skin."

News Notes

—The cornerstone of a new medical and dental laboratory building of the University of Illinois College of Medicine was laid June 4.

—A quarantine was placed on dogs in Elmhurst and Naperville early in June, when the deaths of one child and several head of cattle from rabies were reported.

—The third Frank Billings Lecture of the Thomas Lewis Gilmer Foundation will be delivered by Dr. Henry A. Christian, Hersey professor of theory and practice of physics, Harvard University Medical School and the graduate school, October 26, at a joint meeting of the Institute of Medicine of Chicago and the Chicago Society of Internal Medicine. The topic will be "Edema, Diuretics, Diuresis."

—Free inspection of automobiles, compulsory on all owners of cars since July 1 is expected to reduce accidents by eliminating mechanical defects, and to lessen noise in the city. Every car registered in Chicago will be required to have an inspection twice a year. A city wide rally, as a prelude to the inauguration of compulsory inspection, was held in Grant Park, June 30, under the auspices of the Keep Chicago Safe Committee and the Chicago park district.

—The police bureau of accident prevention has equipped five automobiles with loud speakers to spread a message of traffic safety, according to the Chicago *Tribune*. Each car, manned by two specially trained policemen, will tour the city, particularly in the vicinity of schools, announcing the "do's" and "don'ts" of safe driving and safe walking. Motorists and pedestrians committing minor infractions will be warned politely through the loud speakers.

—An attractive exhibit of a working model of the heart and circulatory system is on display in the Washington Street corridor of the Marshall Field and Company Annex Building.

Members of the Chicago Medical Society are requested to watch this display window, to tell their patients about it, and to make suggestions for future displays to the Educational Committee at 30 North Michigan Avenue.

—Five members who had completed fifty years in the practice of medicine were honored by the Hancock County Medical Society at a dinner meeting in Carthage, July 6. The guests of honor were Drs. Charles L. Ferris, Carthage, who graduated in 1878; Charles A. Runyon, Elvaston, 1884; John A. Miller, Hamilton, 1881; Thomas J. McDaniel, Plymouth, 1886, and John R. Bryant, West Point, 1885. The program included a sound motion picture on "Forceps Delivery," lent by Dr. Joseph B. De Lee, and a motion picture on the heart, shown by Dr. Clayton J. Lundy, Chicago. Speakers included Drs. Leroy H. Sloan and George De Tarnowsky, both of Chicago.

—The state health department has issued a bulletin asking the cooperation of the public in the proper handling of emergencies involving the risk of rabies. The department reports that during the week June 14-20 twenty-six animal heads from seventeen counties were sent to the diagnostic laboratories of the state health department for examination, and during the same period vaccine for giving the Pasteur antirabic treatment to 131 persons in twenty-four counties was sent out by the department. Up to June 30, 373 heads had been examined by the department laboratories this year, vaccine sufficient to treat 1,353 persons had been distributed, and 4,374 cases of dog bite wounds had been reported.

—The state health department reported that two cases of Rocky Mountain spotted fever had recently been recognized in Illinois. One of the patients, a cattle raiser's wife, living on a farm near Canton, told of finding a tick on her head nine days prior to the onset of her illness. Shortly before she had been working with sick steers recently purchased through the Peoria stockyards, where they had been shipped from the West. Apparently the tick had transmitted the disease to this patient, it was said. The other patient, a filling station attendant at Clinton, had no recollection of a tick or other insect bite; presumably an infected insect had been brought along by an automobile party, the department reported.

—There were 1,374 cases referred for examination to the behavior clinic of the criminal court of Cook County during the first five years of its existence, according to a recent report. Of this number, 1,268 received complete psychiatric, psychologic and physical examinations and intensive social service investigation; six were given only physical examinations on order of the judge; sixty-four refused examination or were discharged before a complete examination could be made; thirty-six were short-service cases; that is, they were transferred to the psychiatrist at the House of Correction or sent to some other clinic. There were 199 patients, or 15.6 per cent, who were found to be actively psychotic and were committeed to hospitals for mental disease; 122, or 9.6 per cent, were found to be so mentally defective that commitment to an institution for the feebleminded was warranted; an additional 7 per cent were mentally defective (borderline) but not sufficiently so for commitment; 192, or 15.1 per cent, were found to be suffering from some mental or nervous disorder or personality defect but not serious enough to warrant commitment by the court to a hospital for mental diseases. In most of these cases treatment was recommended; 661 patients, or 52 per cent, showed no evidence of organic or functional nervous or mental disease or feeblemindedness. Under the classification "Psychoses," dementia praecox led the list of diagnoses with a total of sixty; the paranoid state was second with forty-one, and alcoholic psychosis third with twenty. Although it was intended that examinations by the behavior clinic be made after a person was convicted of a crime but not yet sentenced, the majority of cases have been referred after indictment but before conviction.

—The new officers of Chicago Urological Society for the coming year, 1936-37, are as follows: President, Harvey A. Berkey; vice-president, William J. Baker; secretary-treasurer, C. Otis Ritch.

—At the annual meeting of the Chicago Society of Internal Medicine held May 25, the following officers were elected: President, Walter L. Palmer; vice-president, Andrew C. Ivy; secretary-treasurer, Clarence F. G. Brown.

Deaths

WILLIAM HENRY BAHL, Chicago; College of Physicians and Surgeons of Chicago, School of Medicine of the University of Illinois, 1904; aged 63; died, April 23, in the Illinois Masonic Home, Sullivan, of mitral insufficiency.

WILLIAM H. DOAK, Martinsville, Ill.; University of Wooster Medical Department, Cleveland, 1874; aged 93; died, April 23, of arteriosclerosis and chronic nephritis.

MICHAEL HENRY EGAN, Chicago; Minneapolis College of Physicians and Surgeons, 1891; aged 70; died in April.

GORDON VAN BUREN FLETCHER, Chicago; Meharry Medical College, Nashville, 1930; aged 38; on the staff of the Provident Hospital, where he died, April 11, of nephritis.

JAMES WHITNEY HALL, Chicago; Kentucky, School of Medicine, Louisville, 1890; member of the Illinois State Medical Society; served during the World War; for many years a member of the lunacy commission of the Cook County Court; aged 66; died, April 29, in the Illinois Central Hospital, of coronary sclerosis and hypertension.

*FRANK A. NOYES, Biggsville, Ill. (licensed in Illinois in 1878); aged 86; died, April 4.

EVERETT JOSHUA PEEK, White Hall, Ill.; Chicago College of Medicine and Surgery, 1907; aged 57; died, March 21, in Houston, Texas, of coronary occlusion and chronic hypertension.

*IMAS PRYOR RICE, Aurora, Ill.; University of Illinois College of Medicine, Chicago, 1913; a Fellow, A. M. A.; served during the World War; medical director of the Kane County Spring Brook Sanitarium; aged 47; on the staffs of the Sherman Hospital, Elgin and St. Joseph Mercy Hospital, where he died, April 23, of a staphylococcic infection, complicated by pneumonia.

CHARLES RAINEY THOMAS, Roodhouse, Ill.; St. Louis Medical College, 1887; member of the Illinois State Medical Society; past president of the Greene County Medical Society; aged 72; died suddenly, April 3.

*Information as published in June Journal was confused and incorrect.

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